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Digital Camera Special

CAMERA SHOPPER

THE BIGGEST AND BEST PHOTOGRAPHY BUYERS' GUIDE

164 PAGES UPDATED FOR AUTUMN 2015



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The mini marvel



Future

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CAMERA SHOPPER

THE **BIGGEST** AND **BEST** PHOTOGRAPHY BUYERS' GUIDE



The digital camera market is incredibly interesting at the moment. There's a huge battle going on between SLRs and compact system cameras, while compact cameras are under attack from smartphones. And you won't have missed the rise of action cams that let you film outdoor adventures like never before.

It all means that camera manufacturers have to try a bit harder to entice you these days. As a result, even very affordable models are packed full of features, so there's never been a better time to buy yourself a new camera.

With a massive array of cameras vying for your attention, each with their unique selling points, choosing the right camera can be tough. *Camera Shopper* is designed to help you through the maze of choices, bringing you reviews of all the most important and interesting cameras available – from waterproof compacts you can take into the sea on holiday to top-end high-resolution SLRs.

All our reviewers are dedicated photographers who regularly use all sorts of cameras, and every camera is tested in real-world situations as well as in our lab. Our reviews are thorough, honest and 100% independent – so whichever model you are interested in, you can be sure that we've given it a thorough workout. You can choose your new camera with confidence.



Angela Nicholson **Head of testing**



Brought to you by Digital Camera



NEW LOOK!

Camera Shopper is brought to you by the team behind *Digital Camera*, the UK's best-selling monthly photographic magazine. Our reviews are produced by our dedicated testing team, which is made up of experts in the field.

CAMERA SHOPPER

THE **BIGGEST** AND **BEST** PHOTOGRAPHY BUYERS' GUIDE

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A DIGITAL CAMERA SPECIAL





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Imaging lab manager Ali Jennings benchmarks cameras and lenses in our controlled testing environment

Trusted Tests

Rigorous › Accurate › Independent › Fair

Camera Shopper is brought to you by the UK's most experienced team of photography journalists, which means you can trust everything you read on these pages and can buy your next piece of photography equipment with total confidence. In case you need any further convincing, here's why our tests are the best:

Depth

At *Camera Shopper*, we take great pride in the rigorous nature of our testing process. Every product and service is tested in appropriate circumstances, and a combination of real world and objective tests are performed to ensure all products and services are credibly graded. Take a look at the opposite page for more details.

Passion

We believe the best way to test a product is to use it as it was intended, so our real world testing involves taking equipment on a proper shoot – whether outdoors or in the studio – and testing it exactly as you would use it in real life to let you know whether it's fit for purpose.

Objectivity

Although scientific data won't tell you everything about a product, it's a great way to draw direct comparisons and sense-check our real world conclusions, so we've devised a series of controlled tests for cameras and lenses that supplement our real world testing with benchmarks.

Independence

Camera Shopper is 100% independent and never swayed by the influence of advertisers or PR firms. The tests you read in the magazine are our genuine unbiased opinions and Future Publishing, the company behind *Camera Shopper,* has a strict code of conduct on testing.

Transparency

The JPEG files of every test image we shoot can be downloaded from our website, TechRadar (www.techradar.com/cameras). This means you can check the quality for yourself and even run your own tests if you wish.

OUR SCORES AND AWARDS EXPLAINED

Two philosophies underpin our scoring system: transparency and flexibility. Transparency involves keeping our scoring accurate and explaining why we reach a verdict. Flexibility enables us to change our scoring criteria to ensure that each product and service is scored on appropriate criteria – a tripod, for instance, needs to be judged on different qualities than a digital SLR, and a flashgun needs to be judged on different

HOW WE TEST

Camera Shopper's test policy is the most strict and rigorous of any photography magazine. We believe the only way to bring you a genuine and reliable verdict on a product is to test it in both the field and the lab, so we use two sets of criteria to test SLRs and lenses – real-world testing and objective testing.

Real-world testing

The first and most important pillar of our process is real-world testing. We firmly believe that the best measure of a product is how it performs in the field (or studio) doing the job for which it was intended. The majority of our testing time is therefore spent using products in this way, so we can report back on how they cope under a number of different lighting scenarios and conditions.

The first part of our real-world testing involves telling you how a product handles and our impressions of its performance; the second is about examining the image quality produced, so we take a number of photographs under different conditions with every camera and lens we test, which means you can see the results achieved for yourself.

Benchmarking

The second pillar of our testing policy involves testing the output

qualities than a lens. Each of our tests scores out of five in one or more sub-categories and then applies an overall mark out of five, enabling you to tell the wheat from the chaff.

Five scores, five meanings:

Forget it

Below average

Good for the money

Very good in all areas

A truly exceptional, best-in-class product

Awarded to any product that comes top in a group test

Awarded to products that offer exceptional value for money

Awarded to any product that receives five stars in a test

Particularly innovative or breakthrough products receive this special award

A discretionary award given to truly exceptional products

of cameras and lenses under controlled conditions. We shoot a series of test charts that are specifically designed to test different performance aspects of a camera or lens. Further details about the tests we perform can be found in the panel to the right.

To minimise the variables when testing SLRs, we use Sigma's 50mm f/1.4 EX DG HSM prime lens, which is available for every SLR camera system.

Next, we perform an analysis of the test images using Imatest's Imatest Master (www.imatest.com) and DxO Analyzer (www.dxo.com/intl/image_quality/dxo_analyzer) to generate benchmark figures for each test. These can then be plotted against the results from rival products to enable us to make a direct comparison and determine which performs better under different criteria.

Copies of the resolution test chart images are available to download from our website – go to www.techradar.com/cameras, choose the camera you're interested in and browse the review for full details of all tests. Benchmarks shouldn't be seen as a substitute for real-world testing, though – they won't tell you which camera handles best in the field or is easiest to use, but they do enable us to sense-check our real-world image test results and make accurate comparisons of products' capabilities.

No other magazine goes this far to deliver equipment test results you can really trust.

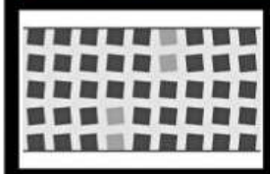


Our head of testing, Angela Nicholson, puts equipment through its paces

THE APPLIANCE OF SCIENCE

Camera Shopper runs tests under controlled conditions on both camera bodies and lenses. Lenses are assessed using an Imatest analysis of photos of three charts. We use both Imatest Master and DxO Analyzer to measure camera performance in four tests. Here's more about each test...

Lens tests



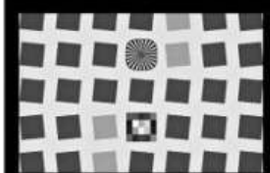
DISTORTION: IMATEST

1 This test measures the distortion caused by the lens. We shoot the simple, lined chart pictured above and then output an accuracy percentage in Imatest. The most accurate result (ie, the best) would be 0%.



FRINGING: IMATEST

2 This test measures the occurrence of chromatic aberration. We shoot the chart pictured above, then analyse the photos using Imatest. The results are expressed in pixels, with lower numbers being better.



SHARPNESS: IMATEST

3 Here we measure sharpness at different apertures from the centre to the outer edge. We shoot the chart pictured and Imatest outputs a figure based on line width divided by picture height – high numbers are better.

Camera tests



DYNAMIC RANGE: DXO ANALYZER

1 This is a measure of a camera's ability to capture detail in the highlights and shadows. We use DxO's transmissive chart, which enables us to test a dynamic range of 13.3 stops.



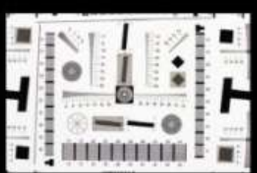
COLOUR ERROR: IMATEST

2 This measures colour reproduction. We shoot the X-Rite ColorChecker chart pictured above and output an accuracy percentage from Imatest, with 100% being the most accurate result possible.



NOISE: DXO ANALYZER

3 We use the dynamic range transmissive chart to analyse the signal-to-noise ratio for raw and JPEG files at every sensitivity setting using DxO Analyzer. A higher value means the signal is cleaner.



RESOLUTION

4 We use a resolution chart based on ISO-12233 from Applied Image Inc to indicate the limit of the camera's vertical resolution at the centre of the frame. The higher the value, the better the detail resolution.

CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

CAMERAS

There's a huge range of cameras, with models that are designed to suit novices as well as enthusiast photographers – whatever you want to shoot



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Waterproof cameras

Snap stunning underwater images with one of these toughened, waterproof wonders

1 Canon PowerShot D30

Price: £239 / $330
Web: www.canon.co.uk



The PowerShot D30's 25-metre waterproof rating may have recently been overshadowed by the Nikon AW130, but this is still a great diving companion. Its ergonomic design features oversized controls that make the camera easy to operate underwater or while wearing gloves. The 3in LCD display is also one of the brightest of the bunch. However, the rest of the D30's specs are more mundane and, unlike the Olympus TG-3 or Panasonic FT5, there's no crushproof rating or Wi-Fi connectivity. Although detail levels are high and there's little evidence of smearing, image noise becomes visible at only ISO 400.

We say: A waterproof wonder, but it won't win any prizes for image quality.

★★★★☆

2 Fujifilm FinePix XP80

Digital Camera GREAT VALUE

Price: £180 / $230
Web: www.fujifilm.eu/uk



Fujifilm's entry is the cheapest here, but it still sports a useful 15m waterproof rating and is shockproof to 1.75m, while also being dustproof and freezeproof. Its 16.4MP sensor copes well in good light, but step indoors and you'll see a drop in detail, and noise quickly becomes apparent. Many tough cameras will also put the XP80's disappointing 210-shot battery life and 9cm macro mode to shame. Built-in Wi-Fi and a time-lapse shooting feature are nice touches at this price point, but they do come at the expense of the quality of camera's LCD screen.

We say: Great value, providing you accept its compromises.

★★★★☆

3 Nikon Coolpix AW130

Price: £279 / $350
Web: www.nikon.co.uk



Features are the AW130's forte. It boasts a terrific GPS system, an interactive world map and Wi-Fi connectivity, plus an altimeter and a depth gauge. It'll also keep up with the action, thanks to a fast 7fps burst shooting mode and an impressive 370-shot battery life. A 30m waterproof rating makes it top of the class, and it'll keep shooting in a -10° cold snap or after a 2.1-metre drop. Downsides? There's no crushproof rating, and the image quality can't match that of the Panasonic FT5. Detail is smeared throughout the sensitivity scale, while occasional exposure metering and white balance inconsistencies can be frustrating.

We say: Almost worthy of top honours – if only images were sharper.

★★★★☆

4 Olympus Stylus TG-3

Digital Camera BEST ON TEST
Digital Camera GOLD AWARD

Price: £350 / $350
Web: www.olympus.co.uk



The TG-3's build quality suggests it could survive pretty much anything you could throw at it. It'll take a drop from 2.1 metres, a -10° freeze, 100kg of force and 15-metre-deep excursions. A chunky, ergonomic shape and well-designed controls makes the TG-3 a pleasure to use in any weather. It's also packed with useful features for when you're out in the wild, like a GPS system, an electronic compass and depth and pressure gauges. But while daytime shots are easy on the eye, low-light image are marred by noise and smearing.

We say: An outstanding tough camera that's worth every penny.

★★★★★

5 Panasonic Lumix DMC-FT5

Price: £270 / $249
Web: www.panasonic.com



The FT5 is getting long in the tooth, but can still cut it against today's models. Its 16.1MP sensor resolves plenty of detail and maintains impressive clarity as high as ISO 1,600. A 4.6x Leica lens provides a 35mm-equivalent focal range of 28–128mm, and is optically stabilised. The FT5's 13m waterproof rating is nothing special, but you can't knock its ability to shrug off a 2m drop, survive -10° freezes or withstand a 100kg crushing. Factor in GPS, Wi-Fi and NFC, and the FT5 shapes up as a great all-rounder.

We say: A fine choice if you can't stretch to the Olympus TG-3.

★★★★☆

6 Ricoh WG-30

Price: £200 / $230
Web: www.ricoh-imaging.co.uk



Despite being one of the less expensive choices here, the WG-30 will still let you dive down to 12m, and it'll survive a drop from up to 1.5m. Inside is a 16MP sensor capable of ISO 6,400 and reasonable image quality, while the 5x optical zoom range is also a match for pricier rivals. Then there's the 1cm macro mode, with six LEDs encircling the lens. However, the cost-cutting shows in the 2.7in screen. The widescreen format makes normal 4:3 shots appear small, and the restricted viewing angles ruin colours.

We say: Not bad for the money, but the Fujifilm XP80 is better value.

★★★☆☆


Digital Camera GREAT VALUE
2
FUJINON LENS 5X WIDE OPTICAL
15m / 50ft WATERPROOF
1.75m / 5.8ft SHOCKPROOF
Wi Fi
XP
5
GPS
POWER O.I.S. / 28mm WIDE
LUMIX
1
GPS
5.0-25.0mm 1:3.9-4.8
CANON ZOOM LENS 5x IS
PowerShot D30
WATERPROOF 25m/82ft
SHOCKPROOF 2.0m/6.5ft
4
Tough
OLYMPUS LENS
4x WIDE OPTICAL ZOOM 4.5-18.0mm 1:2.0-4.9
OLYMPUS
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Digital Camera GOLD AWARD
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Wi Fi
COOLPIX
Nikon
NIKKOR 5X WIDE OPTICAL ZOOM 4.3-21.5mm 1:2.8-4.9 ED VR
WATERPROOF 30m/100ft SHOCKPROOF 2.1m/7ft
6
CRUSHPROOF
FREEZEPROOF
ADVENTURE PROOF
WG-3D
WIDE 5x ZOOM
WATERPROOF
SHOCKPROOF
TEMP CMOS
RICOH

Superzoom compacts

Get the extended reach of a superzoom in a pocket-friendly box that's ideal for days out and trips away



1 Canon PowerShot SX710 HS

Price: £217/$329
Web: www.canon.co.uk

The SX710 HS is especially easy to use thanks to decent ergonomics, unusually large buttons and an excellent three-inch, 922k-dot LCD screen. There are also some useful toys, like Wi-Fi connectivity, NFC pairing and Zoom Framing Assist, which keeps track of a subject when using the full reach of the 30x, 25-750mm-equivalent optical zoom. Inside is a back-illuminated 20.3- megapixel CMOS sensor and Canon's latest Digic 6 image processor, which together give decent – though not exceptional – image quality. In good light up to ISO 400, images stand up to close scrutiny and detail is well resolved, but chroma noise becomes visible at ISO 800 when viewing images at full size.



2 Nikon Coolpix S9900

Price: £249/$297
Web: www.nikon.co.uk

This may be one of the less expensive cameras here, but you wouldn't know it from its features. There's the same 30x optical zoom range as the Canon, along with Wi-Fi and NFC, but also GPS for image geotagging, plus a vari-angle 921k-dot LCD display. This adds bulk, however, and the S9900 is the largest camera here, albeit not by much. However, you can't have it all at this price. There's no viewfinder and the screen isn't touch sensitive, while the 300-shot battery life is only average, and raw recording is absent. This is a pity, because Nikon's image processing is quite aggressive, smoothing more detail than the other cameras and generating a slightly painterly appearance.



3 Olympus Stylus SH-2

Price: £239/$349
Web: www.olympus.co.uk

Where the other cameras boast a 30x optical zoom range, the SH-2 can 'only' manage 24x, equivalent to 25-600mm in 35mm terms. But it makes up for this with a 380-shot battery life, touch control and its ability to shoot in raw (only matched by the Panasonic TZ70). There are plenty of fun filters, along with Wi-Fi and Manual mode, but no Shutter or Aperture Priority and the screen's 460k-dot resolution trails the pack. Image quality is nothing special, either. The SH-2 resolves more detail than the S9900, but can't quite match the Panasonic or Sony cameras. Auto white balance also tends to produce slightly cooler and more muted colours.



4 Panasonic Lumix DMC-TZ70

Price: £283/$319
Web: www.panasonic.co.uk

The TZ70 only has a 12-megapixel sensor, but it's all the better for it, resolving bags of detail with no evidence of smearing. High ISO noise reduction is subtle, meaning you'll see some grain, but fine detail is preserved up to ISO 3,200. The only image quality bugbear is the noticeable chromatic aberration. Elsewhere the TZ70 impresses with Wi-Fi and NFC, a useful multi-functional control ring around the lens, plus a full complement of manual shooting modes. There are also time-lapse video and panorama modes, but the TZ70's stand-out feature is its terrific 1,166k-dot electronic viewfinder. This helps to justify the TZ70's high price, though it's a pity you don't get a touch-sensitive screen.



5 Sony Cyber-shot DSC HX90V

Price: £319/$428
Web: www.sony.co.uk

Considering it packs a 30x optical zoom with 24-720mm-equivalent focal range, the HX90V is incredibly small. Even more impressive is that Sony has managed to cram in a 1,440k-dot pop-up viewfinder. The three-inch, 921k-dot screen doesn't fully articulate and isn't touch-sensitive, but it will flip up for selfie shooting. You also get a lens barrel control ring like the Panasonic TZ70, but Sony's version feels cheaper. Wi-Fi, GPS and exposure bracketing are all present, but raw recording isn't. That's not a deal-breaker, though, because JPEG image quality is superb. Colour reproduction, dynamic range, and exposure metering are all excellent.



6 Sony Cyber-shot DSC-WX500

Price: £255/$287
Web: www.sony.co.uk

The WX500 and HX90V have a lot in common. Externally they're almost identical, with the same exceptionally petite proportions, although without the HX90V's front finger grip, the WX500 is slippery. The similarities aren't just skin-deep, because the two cameras also share the same lens, an 18.2MP Exmor R CMOS sensor and Sony's Bionz X processor. That means you get just as impressive image quality and performance, all for less cash. The catch is you'll have to do without the HX90V's clever viewfinder and GPS, plus some other features, such as high ISO noise-reduction control and flash exposure compensation. At least there's no faulting the 400-shot battery life..





"You can't have it all at this price. The Nikon S9900 has no viewfinder and the screen isn't touch-sensitive"

Action cameras

Six small cameras that enable you to film things you could never film before

1

Drift Ghost-S
Price: £329 / $376
Web: www.driftinnovation.com



The Ghost-S looks like it could withstand a war zone. A sturdy mount design enables the camera to be attached flush, rather than sitting proud like other cameras – a huge advantage. A small screen and Wi-Fi connectivity are bonuses, but what really appeals is the no-fuss operation. The Ghost-S offers 1080p at 60, 50, 30 and 25fps, as well as lower resolutions with higher frame rates. It is water-resistant only, so not a choice for water sports.

We say: A solid, accessible all-rounder.

★★★☆☆

2

Garmin Virb Elite
Price: £159 / $237
Web: www.garmin.com



The **Virb** shows Garmin's GPS expertise, with tracking technology to record your location as well as the action. The Garmin arrives with a GoPro mount adapter for use with GoPro accessories. This camera shoots at 1080p at 30fps and is water-resistant only, so not suitable for water sports. The whole package is well thought out, with a **Virb** Elite App for iOS and Android and editing software for Windows and Mac OS X.

We say: A good choice if you like to record navigation data.

★★★★☆

3

Camera BEST ON TEST
Camera GOLD AWARD

GoPro Hero4 Black
Price: £359 / $499
Web: www.gopro.com



The Hero4 Black is GoPro's flagship model, with loads of video options and accessories. These options enable 4K or slow-motion full HD video at 120fps alongside more standard 1080p full HD options. This makes it a great choice for pro videographers. The removable waterproof housing protects the camera to 40m. If you just want a camera that captures the action, however, the Hero4 Black may be overkill.

We say: If you want advanced features, this is the one you need.

★★★★★

4

iON Air Pro 3
Price: £269 / $239
Web: http://uk.ioncamera.com



The bullet cam style of the Air Pro 3 makes it popular with cyclists who don't want a camera that sticks out. The solid design provides a slide switch to activate recording. Vibrations along with LEDs indicate when recording starts and stops. 1080p or 720p at 30fps can be selected, while 720p at 60fps can be adapted to slow motion through software. The Air Pro is waterproof to 10m.

We say: One of the easiest-to-use action cameras you can get.

★★★☆☆

Camera GOLD AWARD
Camera GREAT VALUE

5

Muvi K-Series K2NPNG
Price: £221 / $299
Web: www.veho-muvi.com



Veho has put a great deal of effort into its Muvi range. The wealth of mounts included in the box is a great move. It's built to withstand the action, and an ultra-tough dive case quotes a maximum depth of 100m – more than we can test. 1080p at 60fps or 720 at 120fps for slow motion can be easily selected. The click-on LCD with zoom buttons is a great addition.

We say: This action camera delivers all that most people will need.

★★★★☆

6

Panasonic HX-500E
Price: £295 / $298
Web: www.panasonic.co.uk



Panasonic's unconventional design for the HX-500E splits the device in two: a camera and a power & control unit. The two sections are connected by a cable, so you must find two different ways to fix the camera to your person or vehicle. However, video quality is excellent, and it's easy to access the options to switch between 1080p and 4K as well as other resolutions and frame rates. NFC, Wi-Fi and a screen are all welcome features that enable you to connect quickly to a mobile device and watch the action back.

We say: Video quality is good, but the connecting cable gets in the way.

★★★☆☆


GHOST-S
HD
DRIFT
1
muvi
ON
OFF
WI-FI
5
Digital Camera GOLD AWARD
Digital Camera GREAT VALUE
HERO4
3
GoPro
gopro.com
Digital Camera GOLD AWARD
Digital Camera BEST ON TEST
Panasonic
4K
6
GARMIN
VIRB
MODE
OK
2
AIR PRO 3
ion
4



2

COMPACT SYSTEM CAMERAS

Some CSCs are more compact than others. **Matthew Richards** tries out six competitors...

Mirrors add weight and bulk to your camera and potentially introduce bounce-blur, but compact system cameras (CSCs) omit the reflex mirror. All but the Leica in this group also do away with any kind of optical viewfinder, substituting it with a high-res electronic finder. The net result is a relatively compact camera that's smaller and more lightweight than a traditional digital SLR, yet retains the benefit of interchangeable lenses.

Some of the top-end CSCs on the market offer direct-access shooting controls, image sensors of anything up to full-frame in size, and a wealth of sophisticated features. Some are as big and weighty as SLR bodies.

The emphasis for the cameras in this test is not so much on downsizing or compactness, but simply delivering a great camera that enables creative photography. Let's take a closer look at what all the cameras have to offer...

THE CONTENDERS

1

Fujifilm X-T1, £880 / $980
Available in original black or graphite, the 16.3MP APS-C format XT-1 from Fujifilm serves up a feast of hands-on controls and lots of new tricks.

2

Leica M-P (typ 240), £5,150 / $7,000
The classic rangefinder camera in its latest digital guise, with a full-frame 24MP CMOS sensor. Who needs autofocus anyway?

3

Olympus OM-D E-M1, £900 / $1,300
Small, tough and beautifully built, the 16.3MP E-M1 takes pride of place in Olympus's Micro Four Thirds stable.

4

Panasonic Lumix DMC-GH4 £1,050 / $1,700
More of a heavyweight Micro Four Thirds camera than the diminutive Olympus E-M1, the 16.1MP GH4 boasts 4K video.

5

Samsung NX1 £1,250 / $1,300
The latest Samsung powerhouse is a 28.2MP APS-C format camera with a very fast 15fps burst rate and impressive video capture resolution.

6

Sony Alpha 7 Mark II £1,250 / $1,500
The second edition of this 24MP Sony is the first ever full-frame camera to feature sensor-shift stabilisation.


SONY
α
7II
Carl Zeiss
Sonnar FE 2.8/35 ZA
6
GH4
LUMIX
4
OM-D
OLYMPUS
3
FUJIFILM
X-T1
1
SAMSUNG
NX1
5



Exposure compensation and shutter speed have dedicated dials, the latter sitting above a metering mode dial.



Fujifilm X-T1
£880/$980
Graphite is the new black

The new 'Graphite' edition of the X-T1 adds features that the earlier Black edition also gets via a firmware upgrade. New tricks include a menu option for switching between the mechanical shutter and a faster electronic shutter, with speeds of up to 1/32,000 sec. There's also a Classic Chrome addition to the range of film emulations, plus a Natural Live View option, which displays previews as nature intended, rather than applying any in-camera effects.



On the top left are concentric dials for the ISO setting and the drive mode.

An excellent update to V4 of the firmware takes the camera further still, with greater autofocus accuracy and tracking performance, plus a range of other enhancements.

The X-T1 packs an APS-C sensor with a modest pixel count of 16.3MP, fast hybrid phase/contrast detection autofocus system and a brisk 8fps burst rate, into a weather-resistant magnesium alloy body. The X-T1's plethora of dials makes it easy for photographers to get to almost any advanced shooting setting without having to navigate menus. That's welcome, considering the LCD isn't a touchscreen, although it does have a tilt facility for easing high or low-level shooting. Wi-Fi connectivity is built in, unlike the flash module, which is supplied as an external clip-on unit.

PERFORMANCE

Sophisticated controls are matched by strong performance. Autofocus is quick, and metering is accurate and consistent. Dynamic range enhancements work well to reign in highlights and boost shadow detail, while Fujifilm's film emulations such as Provia (standard), Velvia (vivid) and Astia (soft) yield beautiful results.

Around the back... Fujifilm X-T1
There's plenty to see and do



Viewfinder
The high-res electronic finder is big and easy on the eye, with custom info options.

LCD
It's not a touchscreen, but it does feature an up/down tilt facility.

AE-L/AF-L
There are separate buttons for auto-exposure lock and autofocus lock.

Q button
The Quick menu is a worthwhile addition to all the direct-access dials and buttons.

Digital Camera

FEATURES	BUILD/HANDLING
IMAGE QUALITY	VALUE

Overall



Next to the shutter speed dial, a lever surrounds the shutter button for access to single, continuous and self-timer modes.



Leica M-P (typ 240) £5,150/$7,000

Classic design meets new age

The Leica brand has been the subject of many a heated discussion over the decades, and the M-P seems certain to further that tradition. Some simply won't be able to get their heads around the notion of a 21st-century digital camera on which you can only set focusing and aperture via an attached lens. Mod cons like Wi-Fi connectivity and touch control are entirely lacking, and the sensitivity range is comparatively stunted at ISO 200-3,200 (100-6,400 expanded). The price will also be a major talking point: with the 35mm f/2 lens pictured above, the camera costs £7,300 / $10,000.



Aperture and focusing can only be set manually, directly via the mounted lens.

The top and bottom plates are hewn from solid brass, and the shell is magnesium alloy. The body is quite chunky yet slab-like in design, without any moulded grip areas. This can make handling feel awkward and insecure, especially considering that the Leica is the heaviest camera in the group at 690g, excluding the lens.

The rangefinder system takes some getting used to, but it's well implemented. The optical viewfinder incorporates guide lines to show how much you'll be able to fit into images when using different focal lengths of lens. A key upgrade in the M-P, however, is that it uses a CMOS rather than a CCD image sensor.

Around the back... Leica M-P (typ 240)

Let's go back in time to manual settings



Viewfinder
The rangefinder enables superimposed and split images for accurately setting the manual focus.

Left buttons
The main controls are arranged on the left side of the rear, including access to Live View and ISO.

Hotshoe
An optional electronic viewfinder is available which fits into the hotshoe.

Setting dial
A single setting dial enables adjustments to the shooting parameters.

PERFORMANCE

Despite its bare-bones layout of controls, the Leica is capable of gorgeous image quality, in both raw and JPEG modes. However, image noise is more noticeable than in the competing cameras in this group, especially at sensitivity settings of ISO 1,600 and upwards.

Digital Camera

FEATURES	BUILD/HANDLING
★★☆☆☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★☆☆☆

Overall ★★★☆☆



The conventional layout of the Olympus OM-D E-M1 includes a shooting mode dial plus front and rear command dials.



Olympus OM-D E-M1

£900/$1,300

Top of the OM-D line-up

The most upmarket of Olympus's OM-D range of CSCs, the E-M1 is one of the smallest and lightest models on test. Slightly bigger and heavier than the Fujifilm X-T1, the E-M1 has a smaller image sensor, but the same pixel count of 16.3MP.

The E-M1 boasts a hybrid autofocus system with phase/contrast detection. Autofocus is available on heritage Four Thirds lenses, as well as Micro Four Thirds lenses made by Olympus and other manufacturers.



Drive, HDR, autofocus and metering modes are all accessible from buttons on the top left.

Further highlights include a five-axis sensor-shift image stabiliser, directly competing with the Sony A7 II camera. It works well for both stills and video shooting, as well as giving a stabilised view in the electronic viewfinder and rear LCD screen. The latter is a high-res touchscreen with up/down tilt facility. It's neat being able to touch areas of the screen to assign autofocus points, but Olympus missed a trick by not extending touch control to menu navigation.

Despite the E-M1's small size, it's comfortable thanks to the deep sculpting in the finger grip to enable a secure hold. Handling is enhanced by direct-access buttons and dials, providing shortcuts to settings.

PERFORMANCE

Metering is consistent and accurate, and autofocus is swift. The auto white balance system tends to stray to the warm side, especially in direct sunlight. With the relatively large 2.0x focal length magnifier of the Micro Four Thirds system, it's more difficult to get a tight depth of field, but Micro Four Thirds lenses tend to be quite compact. Retention of fine detail in images could be better.

Around the back... Olympus OM-D E-M1

It's all pretty clear and simple



Viewfinder
A proximity sensor enables automatic switching between the EVF and the rear LCD.

LCD
The tilting touchscreen is great, but touch selection doesn't extend to menus.

AEL/AFL
The two-position switch changes the function of the rear command dial.

Fn buttons
Several of the buttons on the back, top and front are customisable.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★☆	★★★★☆
IMAGE QUALITY	VALUE
★★★★☆	★★★★☆

Overall ★★★★☆



The mode dial includes three custom settings, and direct controls are on hand for WB, ISO and exposure compensation.



Panasonic Lumix GH4

£1,050/$1,700

A Micro Four Thirds camera on a grand scale

Compared with the other Micro Four Thirds cameras, the GH4 looks bigger and beefier. The increase in height enables the fitment of a built-in flash module, and part of the heavier weight is accounted for by a larger and higher-capacity battery, capable of 500 shots between recharges, compared with the Olympus E-M1's 330 shots. Both take the same mount Micro Four Thirds lenses, although the GH4 has purely contrast-detection autofocus, rather than the E-M1's hybrid system.



A dedicated drive mode dial is situated top left.

One of the improvements over the older GH3 is that the GH4 captures 4K Ultra High Definition video. There are also knock-on benefits for stills shooting, with a fast and powerful image processor that enables a burst rate of up to 12fps. The GH4 has a clear, high-resolution electronic viewfinder, and a high-res LCD screen to match. The GH4 is the only camera in this group to feature full screen articulation rather than just a tilt facility. It's well connected too, with built-in Wi-Fi and NFC (Near Field Communication) connectivity.

The handling benefits from SLR-like styling that incorporates a deeply sculpted finger grip and plentiful controls for the finer points of shooting settings.

PERFORMANCE

One thing that isn't updated in the GH4 is the pixel count of the sensor, which remains at 16.1MP. Image quality is very good overall, but you can sometimes feel short-changed by the level of fine detail that's reproduced in images. Even so, it hangs on to detail better at high ISO settings than the competing E-M1.

Around the back... Panasonic Lumix GH4

A great swing-out touchscreen



Viewfinder
The electronic viewfinder is big, bright and detailed.

LCD screen
The GH4 is the only camera in the group to feature a swing-out, fully articulated touchscreen.

AF modes
The AF mode lever is conveniently placed around the AF/AE lock button.

Fn buttons
There are plenty of customisable function buttons for tailoring the GH4's operation.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★★	★★★★☆
IMAGE QUALITY	VALUE
★★★★☆	★★★★☆

Overall ★★★★☆



The NX1 is in a minority of one in this group by featuring a top-plate LCD screen, lending the camera body a pro feel.



Samsung NX1

£1,250/$1,300

The least compact in the group

Like the Fujifilm X-T1, the Samsung NX1 is based around an APS-C format image sensor, but this time the megapixel count is hiked up to 28.2MP, the biggest value in the group. It's also the biggest camera in the group, although it's still some 40g lighter than the Leica. The design looks more high-end SLR than CSC. For example, the Samsung is the only camera in the group to sport a secondary info LCD on its top panel. Under the skin, a powerful new processor helps to enable a fast burst rate of up to 15fps. That's no mean feat considering the 28MP image size.



Direct-access buttons on the left are for AF, metering, WB and ISO.

The native sensitivity range goes from ISO 100-25,600, boosted to ISO 51,200 in expanded mode. Video capture resolution is impressive, matching the Panasonic GH4's 4K Ultra High Definition credentials. Further finery includes a hybrid phase/contrast autofocus system, a tilting touchscreen and a large, bright electronic viewfinder. There's Wi-Fi and NFC connectivity plus a built-in pop-up flash, wrapped in a weather-resistant magnesium alloy shell.

Handling is good, and the layout of buttons and dials is logical, while giving instant access to wide-ranging shooting settings. However, this is a big, hefty camera, even when paired with Samsung's 16-50mm f/2.8 OIS lens, pictured above.

Around the back... Samsung NX1

It's roomy and comfortable



Viewfinder
Sharp and clear, the EVF has a wealth of shooting information.

Touchscreen
The excellent Super AMOLED touchscreen has an up/down tilt facility.

AF on
The AF on button will find favour with sports photographers.

Multi-way pad
The multi-way pad has an additional rotary dial around its circumference.

PERFORMANCE

It's rare that we'd recommend a CSC for action and sports photography, but the Samsung's fast autofocus and continuous drive rate make it well suited. There's excellent retention of fine detail too, with well-suppressed image noise even at high ISO settings.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★★	★★★★½
IMAGE QUALITY	**VALUE**
★★★★★	★★★★½

Overall ★★★★★



As with most of the other cameras in this test group, the tilting screen makes for straightforward high or low-level shooting.



Sony Alpha 7 Mark II

£1,250/$1,500

Small camera, big stable sensor

The diminutive Sony A7 Mark II is smaller than the Micro Four Thirds Panasonic GH4, yet has a full-frame sensor. It's actually the same 24.3MP CMOS sensor that was used in the original A7, but the Mark II adds sensor-shift stabilisation. It's the first full-frame camera to feature built-in stabilisation, and in this group, only it and the Olympus E-M1 with its relatively small Micro Four Thirds sensor give in-body stabilisation. Both feature advanced, five-axis stabilisation, giving a clear benefit when attaching any lens.



The shooting mode dial includes two custom positions, and there's a dedicated exposure compensation dial.

The A7 Mark II is comfortable, aided by its deeply sculpted finger and thumb grips. Controls are plentiful and menu navigation is easy, helped by a multi-way pad that features a rotary dial, as used in the Panasonic and Samsung cameras. You'll rely on it more, however, as the Sony lacks a touchscreen. At least the screen has a tilt facility, and the camera itself has built-in Wi-Fi and NFC connectivity.

The autofocus system gets a speed boost, with a greater ability to track moving subjects. This makes the A7 Mark II better suited to action photography, although the 5fps maximum burst rate is quite pedestrian.

PERFORMANCE

The A7 Mark II delivers excellent retention of fine detail. In our tests, the stabiliser gave a four-stop benefit in handheld shooting, equalling the performance of the competing system in the Olympus E-M1. However, the Sony makes the most of its bigger image sensor in terms of sumptuous image quality. The camera is supported by a growing range of excellent full-frame compatible lenses.

Around the back... Sony Alpha 7 Mark II

Everything is very neat and tidy



Viewfinder
Typically large and clear, the viewfinder also shows the effect of the camera's stabiliser.

LCD
It's not a touchscreen, but it has the highest resolution in this group.

AF/MF AEL modes
Auto/manual focus and auto exposure lock share the same button, switched by a lever.

Multi-way pad
This gives direct access to drive modes, display options and ISO.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★½	★★★★★

Overall ★★★★★

IMAGE QUALITY IN FOCUS

OUTDOOR

FUJIFILM X-T1



Very natural results are assured in the standard Provia film mode, with pleasing saturation, colour balance and contrast.

LEICA M-P (TYP 240)



Colour rendition and metering are a very close match to that of the Fujifilm X-T1, although the Leica's shadows are a little deeper.

OLYMPUS OM-DE-M1



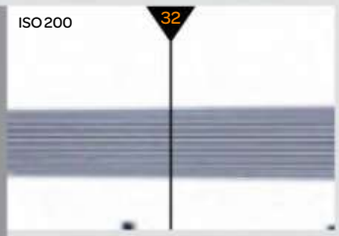
We've often seen added warmth under direct sunlight with Auto White Balance selected in Olympus cameras. The E-M1 is no exception.

PANASONIC GH4

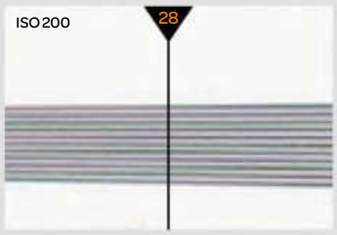


Colour balance for this sunny shot is very similar to that of the E-M1. Both Micro Four Thirds cameras are a little on the warm side.

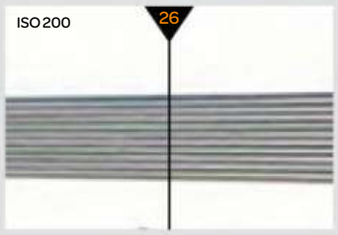
RESOLUTION



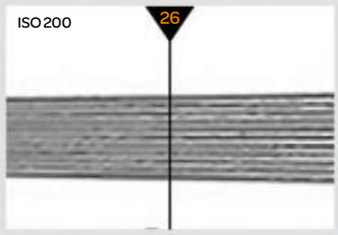
In raw quality mode, the Fujifilm X-T1 is a surprise winner in the resolution stakes, with the best scores of any camera on test.



Good but not outstanding, the Leica is beaten on resolution scores by the Sony full-frame contender, and the Fujifilm and Samsung APS-C

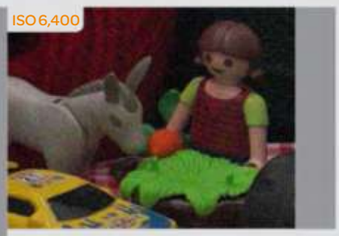


It's joint bottom in the group with the Panasonic GH4, although the E-M1's resolution drops off more at higher ISO settings.



As with the competing Olympus camera, resolution is below average, but fine detail is retained better at ISO 1,600 and above.

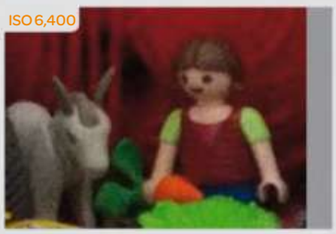
NOISE



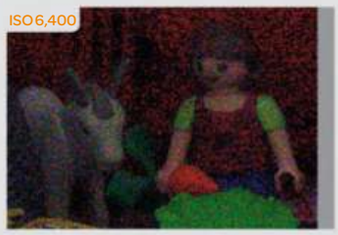
A trade-off of the very high raw resolution scores is that noise can be more noticeable than usual, but high-ISO JPEGs are clean.



The Leica hits the buffers at ISO 6,400, and at this highest available setting, noise is more visible than from the other cameras.



Noise is well-controlled on the whole, and the E-M1 gets its second wind at ISO 6,400 and above, delivering impressively clean

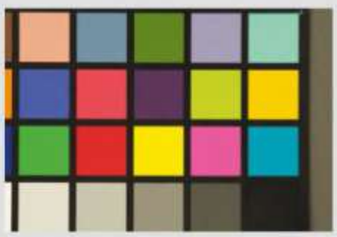


Despite its small Micro Four Thirds sensor, the GH4 delivers the best scores for raw signal-to-noise ratio of any camera on test.

COLOUR ERROR



The lab score for colour accuracy isn't particularly great, but overall colour rendition is simply gorgeous, in wide-ranging lighting conditions.



Technically, the colour accuracy score is the worst of any camera in the group, but real-world photos look endearingly lifelike.



Good in most conditions, colour accuracy proved outstanding in our lab tests, with the best score in the whole group.



It's less accurate than the Olympus E-M1 in the lab, but both cameras tend to give very similar colour rendition in outdoor shooting.

IMAGE TEST VERDICT

Glorious image quality is practically guaranteed even in tricky shooting conditions, surpassing the expectations of a 16.3MP APS-C format

★★★★★

IMAGE TEST VERDICT

Overall image quality can be beautiful, but the Leica doesn't make the most of its full-frame sensor, especially in terms of noise at high ISO

★★★★☆

IMAGE TEST VERDICT

Colour balance can be a bit warm in direct sunlight, and fine detail is a little disappointing, but image quality is very satisfying overall

★★★★☆

IMAGE TEST VERDICT

Resolution and colour accuracy could be slightly better, but overall image quality is very good indeed, even at very high ISO settings.

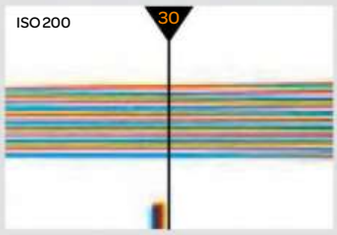
★★★★☆

SAMSUNG NX1

ISO 200

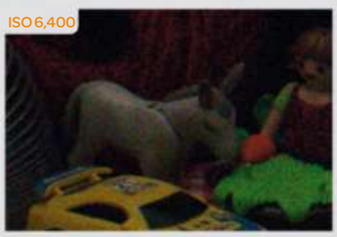


Colour balance is lifelike, but it can be marginally on the cool side. Landscapes benefit from impressive retention of fine detail.



It level-pegs the full-frame Sony for resolution for nearly the whole sensitivity range, only falling behind slightly at ISO 12,800 and above.

ISO 6,400



Noise characteristics are similar to those of the Fujifilm X-T1, which is impressive given the Samsung's much greater pixel count.



The slight coolness of the Samsung's colour rendition is reflected in its lab test score, which is second-worst to the Leica.

IMAGE TEST VERDICT

Overall image quality is excellent, with excellent resolution scores and minimal noise even at high sensitivity settings.

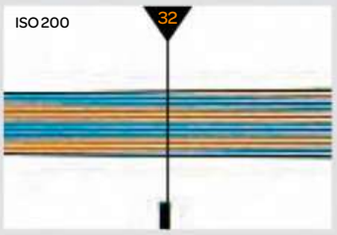
★★★★★

SONY ALPHA 7 MARK II

ISO 200

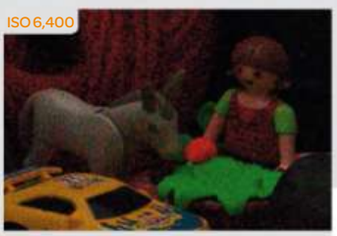


Landscape shots look lively but entirely natural, with superb dynamic range, accurate colour rendition and immense detail.



There's excellent resolution throughout the sensitivity range, in both raw and JPEG quality modes. It's impressive at high ISO settings.

ISO 6,400



A close second to the Panasonic GH4 for raw signal-to-noise ratio, the Sony edges ahead for noise-suppression



Impeccable colour rendition is delivered in wide-ranging indoor and outdoor lighting conditions. It's another of the Sony's strong suits.

IMAGE TEST VERDICT

Spectacular raw image quality, and JPEGs look stunning straight off the camera. Handheld results benefit from the new stabilisation system.

★★★★½

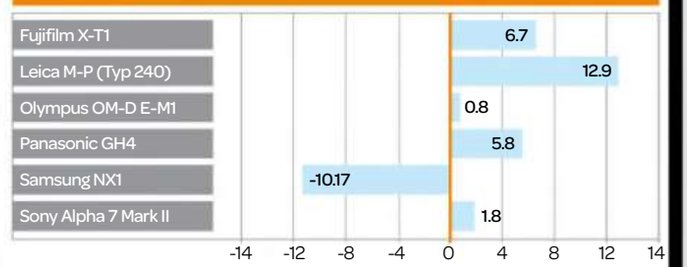
CAMERA BENCHMARKS

How the cameras fare in our lab tests

WHAT'S THIS? Find out how we test on page 6

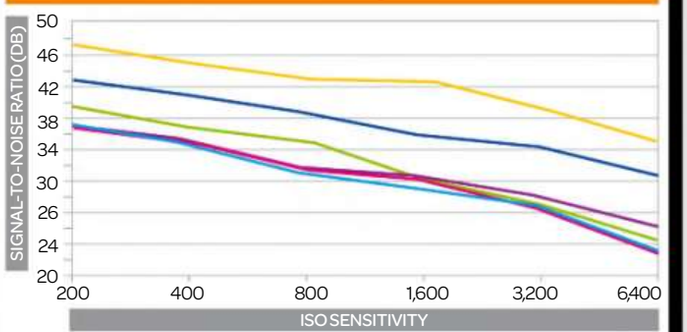
Considering its relatively small Micro Four Thirds format image sensor, the Panasonic GH4 surprisingly turns in the best results for raw signal-to-noise ratio, although it's overtaken by the Fujifilm X-T1 in JPEG mode. Equally surprising is that the X-T1 delivers the best scores for resolution, despite having a 16.3MP APS-C format sensor, compared with the 24MP full-frame sensors of the Leica and Sony cameras.

RAW COLOUR ERROR* Scores closer to zero are better



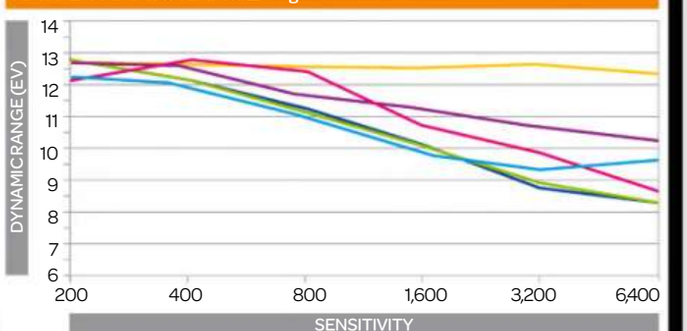
COLOUR ERROR RESULT: The Sony and Olympus lead the way, but the Sony maintains better accuracy in wider-ranging lighting conditions.

RAW SIGNAL-TO-NOISE RATIO* Higher scores are better



NOISE RESULT: The Panasonic and Sony cameras come out on top for raw signal-to-noise performance, but the Fujifilm is best in JPEG mode.

RAW DYNAMIC RANGE* Higher scores are better



DYNAMIC RANGE RESULT: The Leica and Fujifilm cameras lag a little behind the competition for raw dynamic range at most ISO settings.

KEY
Fujifilm X-T1 · Leica M-P · Olympus OM-D E-M1
Panasonic GH4 · Samsung NX1 · Sony Alpha 7 Mk II

*** Raw results use images converted to TIFF**



THE DIGITAL CAMERA VERDICT

IT'S A SONY SUCCESS STORY

There's very little in it, but the Sony A7 Mark II comes out on top

The Sony A7 Mark II's compact build plays host to a stabilised full-frame sensor, which is a world first for any digital camera. The growing range of compatible lenses make it a serious alternative to top-flight full-frame SLRs, yet its small size and light weight add convenience, without any adverse effects on handling.

Most of the same holds true for the Fujifilm X-T1, which punches well above its weight in terms of image quality for a 16.3MP APS-C format camera. It's a really tough buying decision between these two cameras, but the Sony wins out, especially if you prefer the reduced depth of field available from a full-frame body.

The Samsung NX1 is another very exciting APS-C format camera that mimics full-blown SLRs in its size and styling. The image sensor's pixel count of 28.2MP will be extremely attractive to many, and the overall standard of build, handling and image quality is very good indeed, putting it in third place.

Above A compact build contains impressive features.

Next up are the two Micro Four Thirds cameras, the Panasonic GH4 edging ahead of the older Olympus E-M1. We prefer the GH4's fully articulated screen, 4K Ultra High Definition video and marginally better overall image quality. Last up, the Leica is a true 'Marmite' camera – you'll either love it or hate it, even if you can afford it.

HOW THE CAMERAS COMPARE



	Fujifilm X-T1	Leica M-P (typ 240)	Olympus OM-D E-M1	Panasonic Lumix GH4	Samsung NX1	Sony Alpha 7 Mark II
Website	www.fujifilm.co.uk	www.leica-camera.com	www.olympus.co.uk	www.panasonic.co.uk	www.samsung.co.uk	www.sony.co.uk
Street price (body)	£880 / $980	£5,150 / $7,000	£900 / $1,300	£1,050 / $1,700	£1,300 / $1,300	£1,400/$1,500
Sensor (size in mm)	16.3MP CMOS (23.6 x 15.6)	24MP CMOS (35.8 x 23.9)	16.3MP Live MOS (17.3 x 13.0)	16.1MP Live MOS (17.3 x 13.0)	28.2MP CMOS (23.5 x 15.7)	24.3MP CMOS (35.8 x 23.9)
Mount (crop factor)	Fujifilm X (1.5x)	Leica M (1.0x)	Micro 4/3 (2.0x)	Micro 4/3 (2.0x)	Samsung NX (1.5x)	Sony E (1.0x)
Memory	SD / HC / XC	SD / HC / XC	SD / HC / XC	SD / HC / XC	SD / HC / XC	Memory Stick / SD / HC / XC
Viewfinder	Electronic, 2,360k, 100%	Optical (opt electronic)	Electronic, 2,360k, 100%	Electronic, 2,359k, 100%	Electronic, 2,360k, 100%	Electronic, 2,359k, 100%
Image stabilisation	Via lens	N/A	Sensor-shift	Via lens	Via lens	Sensor-shift
Video - max resolution	1080p	1080p	1080p	4K	4K	1080p
ISO range (expanded)	ISO 200-6,400 (100-51,200)	ISO 200-3,200 (100-6,400)	ISO 200-1,600 (100-25,600)	ISO 200-25,600 (100)	ISO 100-25,600 (51,200)	ISO 100-51,200
Autofocus	Hybrid phase/contrast	None (manual only)	Hybrid phase/contrast	Contrast AF	Hybrid phase/contrast	Hybrid phase/contrast
Shutter speeds	30-1/4,000 sec, Bulb 60m	8-1/4,000 sec, Bulb 60s	60-1/8,000 sec, Bulb 30m	60-1/8,000 sec, Bulb 60m	30-1/8,000 sec, Bulb	30-1/8,000 sec, Bulb
Max burst rate	8.0 frames per second	3.0 frames per second	10.0 frames per second	12.0 frames per second	15.0 frames per second	5.0 frames per second
Pop-up flash	No	No	No	Yes	Yes	No
Wi-Fi	Yes	No	Yes	Yes (+NFC)	Yes (+NFC)	Yes (+NFC)
LCD screen	3.0-inch, 1,040k, tilt	3.0-inch, 920k, fixed	3.0-inch, 1,037k, tilt, touch	3.0-inch, 1,036k, pivot, touch	3.0-inch, 1,040k, tilt, touch	3.0-inch, 1,229k, tilt
Body (W x H x D)	129 x 90 x 47mm	139 x 80 x 42mm	130 x 94 x 63mm	133 x 93 x 84mm	139 x 102 x 66mm	127 x 96 x 60mm
Body weight	440g	680g	497g	560g	640g	599g
Battery life	350 shots	500 shots	330 shots	500 shots	500 shots	350 shots
FEATURES	★★★★½	★★½☆☆	★★★★½	★★★★★	★★★★★	★★★★★
BUILD QUALITY	★★★★★	★★★★½	★★★★½	★★★★½	★★★★½	★★★★★
IMAGE QUALITY	★★★★★	★★★★½	★★★★½	★★★★½	★★★★★	★★★★½
VALUE	★★★★★	★★½☆☆	★★★★½	★★★★½	★★★★½	★★★★★
OVERALL	★★★★★	★★★½☆	★★★★½	★★★★½	★★★★★	★★★★★



Digital Camera BEST ON TEST

Digital Camera GOLD AWARD

1st SONY ALPHA 7 MARK II

What's good: Full-frame image sensor; five-axis stabilisation; great handling; small size.

What's bad: Lacks a touchscreen; full-frame compatible lenses can dwarf the body.

We say: For creative full-frame photography in a small, lightweight package, it's unbeatable.

★★★★★



Digital Camera GOLD AWARD

Digital Camera GREAT VALUE

2nd FUJIFILM X-T1

What's good: Superb image quality; slick retro styling; excellent build quality; compact design.

What's bad: 16.3MP is fairly modest for an APS-C image sensor; no touchscreen facility

We say: It's a fabulous camera, a real joy to use, and great value at the price.

★★★★★

Digital Camera

OUR TEST RESULTS

Our favourite compact system cameras



Digital Camera GOLD AWARD

3rd SAMSUNG NX1

What's good: High-tech thrills with a 28.2MP sensor; 4K video and 15fps burst rate for stills.

What's bad: Relatively big and heavy; colour balance tends to be slightly cool.

We say: It's the best Samsung camera to date, and a particularly good CSC for action sports.

★★★★★



4th PANASONIC GH4

What's good: 4K video capture; fully articulated touchscreen; built-in pop-up flash.

What's bad: Relatively small Micro Four Thirds image sensor; lacks the EM-1's image stabiliser.

We say: It's a slightly better buy than the older Olympus E-M1, especially if you're into 4K video.

★★★★☆



5th OLYMPUS OM-D E-M1

What's good: Five-axis image stabiliser; tough but compact build; tilting touchscreen.

What's bad: Colour balance can be a little warm; touchscreen doesn't work for menus.

We say: One of our previous favourite CSCs, but it's lost ground to newer competition.

★★★★☆



6th LEICA M-P (TYP 240)

What's good: High-precision quality build; full-frame sensor; good manual controls.

What's bad: Lacks autofocus or automatic aperture selection; 'noisy' at high sensitivities.

We say: It's classy and well suited to manual photography, but fiendishly expensive.

★★★☆☆



SIMPLY THE BEST

What's the best body that money can buy? **Matthew Richards** goes through a veritable wish list of cameras, in pursuit of perfection



THE CONTENDERS

1. Canon EOS 5D Mark III, £2,250 / $2,500
An easily manageable sub-1kg body that packs a 22.3MP sensor, Digic 5+ processor, 6fps shooting and an expanded sensitivity range of ISO 50–102,400.

2. Canon EOS 1D X, £4,850 / $6,000
The full-size 1D X is an 18.1MP camera with dual Digic 5+ processors, continuous shooting at up to 14fps, and an expanded sensitivity range of ISO 50–204,800.

3. Nikon D810, £2,400 / $3,000
Nikon's comfortably sized D810 goes large in terms of pixel count, with a 36.3MP sensor, an Expeed 4 processor, ISO 32–51,200 expanded sensitivity and 5fps shooting.

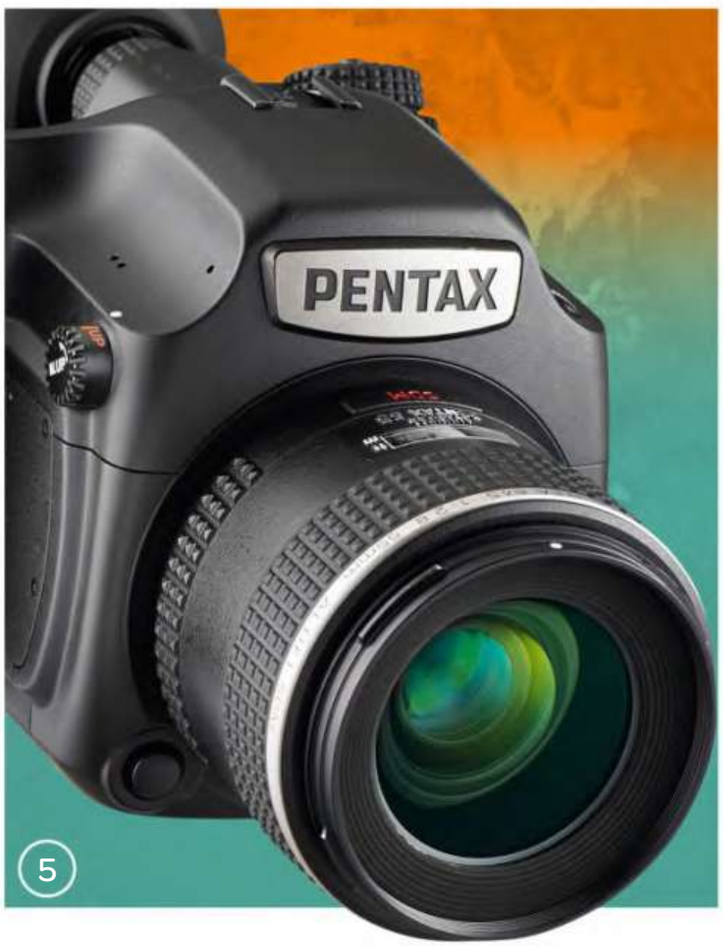
4. Nikon D4S, £4,500 / $6,000
The top-flight Nikon D4S couples a modest 16.2MP sensor with an Expeed 4 processor, and enables fast 11fps continuous shooting plus a massive ISO 50–409,600 expanded sensitivity range.

5. Pentax 645Z, £6,800 / $8,500
With an upsized 51.4MP, 44 x 22mm medium-format image sensor, the 645Z has Prime III processing, a 3fps maximum drive rate and ISO 100–204,800 sensitivity.

6. Sony Alpha 7R, £1,340 / $2,100
This relatively small full-frame compact system camera has a 36.4MP full-frame sensor, a Bionz X processor, ISO 100–25,600 sensitivity range and a drive rate of up to 4fps.









Photography: Neil Godwin



Digital Camera GOLD AWARD

Digital Camera GREAT VALUE

Canon EOS 5D Mark III

£2,250 / $2,500

Don't write off this 'old' Canon just yet

The 5D Mk III has been around for three years, but still looks a very fresh camera with winning specifications. It's a major update to the previous Mk II edition, boasting huge advances in image processing, autofocus and metering, as well as a much greater sensitivity range that stretches to ISO 25,600 instead of ISO 6,400 in its standard range, rising to a mighty ISO 102,400 in expanded mode. The maximum burst rate also gets a boost from 3.9fps to 6fps, edging ahead of the competing Nikon D810 (page 122) with its 5fps rate.



Top control buttons These include access to metering mode, white balance, autofocus mode, drive mode and ISO.

Despite impressive attractions, like including the same 61-point autofocus system as the top-flight 1D X, the 5D Mk III has had much of its thunder stolen by the announcement of the forthcoming 5DS and 5DS R. The big selling point of these cameras is their massive pixel count of 50.6MP, backed up by dual, later-generation Digic 6 processors. Indeed, the 5D Mk III has been criticised in some quarters for its relatively modest pixel count of 22.3MP. The 50.6MP resolution of the 5DS and 5DS R comes at the expense of a smaller sensitivity range of ISO 100-6400 (50-12,800 expanded) and a drop in maximum burst rate to 5fps, though.

PERFORMANCE

The 5D Mk III packs serious performance into its reasonably compact, 950g body. Autofocus and metering are both unerringly accurate and dependable, while image quality remains superb, even at very high ISO settings. Direct controls for shooting parameters are plentiful without being confusing or fiddly. Overall, it's a fabulous camera at an attractive price.

Around the back... Canon EOS 5D Mark III

A scaled-down but sensible layout



Viewfinder Giving 100% frame coverage, the viewfinder is another area in which the 5D Mk III betters the Mk II edition.

Left-hand buttons Compared with the 1D X, the bottom strip of buttons has been moved to the left side.

LCD screen The high-res 3.2-inch, 1,040k-dot screen offers auto-brightness adjustment.

Dual controllers As in the 1D X, the joystick-like multi controller is positioned separately to the quick control dial.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★½	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★★

Overall ★★★★★



Digital Camera BEST ON TEST

Digital Camera GOLD AWARD

Canon EOS 1D X

£4,850 / $6,000

Wallow in Canon's top-speed, top-spec digital SLR

Canon's flagship stills SLR has a built-in vertical grip, duplicating the shutter button and other vital controls for use in portrait-orientation shooting. It's very similar to the Nikon D4S in this respect, although the system is implemented particularly well in the 1D X, to the extent where handling feels almost identical when shooting in landscape or portrait orientation. The trade-off is that duplication of controls makes the camera bigger, bulkier and heavier, the 1D X weighing 1,340g compared with the 5D Mk III's 950g.



Mode buttons
Alternative modes for shooting, autofocus, drive and metering are available top left of the camera.

The metering and autofocus systems are the same in both Canon cameras. Autofocus itself is based on a 61-point module that contains no fewer than 41 cross-type points, of which five are 'dual' cross-type for ultimate accuracy. Both cameras also feature Digic 5+ processing, although the 1D X has two processors rather than one. Coupled with a pixel count of 18.1MP, this enables a super-fast continuous drive speed of up to 12fps.

The 1D X has dual CompactFlash memory slots and a buffer that's large enough to accommodate 38 raw files. There's sufficient battery capacity for about 1,120 shots – but the Nikon power pack gives 3,020.

PERFORMANCE

While the main performance boost over the 5D Mk III comes in terms of maximum drive rate, along with better portrait-orientation handling, image quality is practically identical from both cameras. The only notable difference is that images are a little less noisy at ultra-high ISO settings and the 1D X goes a stop further in standard and expanded ISO ranges.

Around the back... Canon EOS 1D X

High, wide and feature-packed



Viewfinder
Big, bright and with 100% coverage, it also features a built-in shutter for tripod-shooting.

LCD screen
Like the 5D Mk III, it has a 3.2-inch, 1,040k-dot LCD but there's no auto-brightness option here.

Vertical grip buttons
AF-on, exposure lock and autofocus point selection buttons are duplicated in the bottom right.

Lower rear info screen
This screen sits below playback buttons and a wired Ethernet status lamp.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★★	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★½

Overall ★★★★★



Digital Camera GOLD AWARD

Nikon D810

£2,400 / $3,000

Nikon's latest high-res SLR moves things along

The D800 caused quite a stir when it was launched back in 2012, around the same time as the Canon 5D Mk III. Its main selling point was the comparatively monstrous pixel count of 36.3MP, putting the Canon firmly in the shade in this respect. The 800E followed, reducing the anti-aliasing element of its low-pass filter, thereby eking out the greatest possible sharpness at an increased risk of moiré patterning. The D810 has replaced both, and has no low-pass filter at all.



Pop-up flash
It's the only camera in the whole group to feature a pop-up flash module.

Improvements over the D800 and D800E include a later-generation Expeed 4 image processor, a faster 5fps continuous drive rate (7fps in APS-C format crop mode), an increase in maximum sensitivity from ISO 6,400 to 12,800 (from ISO 25,600 to 51,200 in expanded mode), and a larger memory buffer. Another interesting upgrade is to the shutter and reflex mirror assembly.

The Nikon D810 shares the same range-topping autofocus and metering systems as its big brother, the top-flight D4S. The 51-point AF has 15 cross-type points; Nikon claims that it has been fine-tuned for accuracy, to make the most of the D810's ultra-high-resolution images.

PERFORMANCE

We found the autofocus system to be noticeably quicker than that of the older D800, and there's slightly less lag and vibration in the reflex mirror. Even so, it's best to use a tripod and the exposure delay mode, which flips the mirror up before the shot is taken. A minus point is that image noise at high ISO settings is more noticeable than with the Canon 5D Mk III.

Around the back... Nikon D810

It's mostly familiar but a bit different



Left-hand buttons
The layout and functions of the left-hand button strip is almost identical to that of the D4S.

LCD screen
A new 3.2-inch screen boosts resolution to 1,229k pixels and has fine-tune adjustments.

Viewfinder
The pentaprism viewfinder gives full 100% frame coverage and has a built-in shutter for tripod use.

Info button
The 'i' button will be familiar to Nikon shooters, giving access to a range of shooting parameters.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★½	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★½

Overall ★★★★★



Digital Camera GOLD AWARD

Nikon D4S

£4,500 / $6,000

The go-faster Nikon with all the frills

The direct competitor to the Canon 1D X, this is the latest in Nikon's line of top-spec, fully professional camera bodies. The margin between it and the less expensive D810 has narrowed: for example, both Nikon cameras have the same autofocus and metering modules, as well as the same-generation Expeed 4 image processor. That said, there have been notable upgrades in all three areas, compared with the preceding Nikon D4.



Top LCD
Next to the large top LCD are buttons for shooting mode selection and exposure compensation.

Nikon claims better performance for autofocus and metering, as well as a faster maximum drive rate. While the D4S delivers the same top drive speed of 11fps as the older D4, this time it comes complete with full-time autofocus and metering throughout a series of shots. Even so, the Canon 1D X manages the same feat with a slightly faster 12fps. Both the D4S and the D810 share an upgraded mirror and shutter mechanism, for reduced lag and smoother movement. However, the D4S makes more of its Expeed 4 upgrade when it comes to sensitivity range. The upside of its 16.2MP pixel count is that sensitivity stretches a further stop in the standard range and three extra stops in expanded trim, to ISO 25,600 and 409,600 respectively.

PERFORMANCE

The super-fast drive rate is matched by accurate autofocus that's very rapid, at least when using Nikon's best lenses and their fast ultrasonic AF systems. The auto white balance system is neither quite as accurate nor as consistent as in the Canon cameras here, but it's slightly more convincing than in preceding Nikon models.

Around the back... Nikon D4S

There are buttons aplenty



Left-hand buttons
Playback controls are mostly grouped down the left-hand side of the rear.

Viewfinder and LCD
There's really little to choose between the D4S and D810 in both respects.

Dual controllers
So-called 'multi-selectors' are duplicated for improved portrait orientation shots.

Lower deck
This incorporates an additional info LCD and controls for ISO, quality, white balance and Live View/video.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★★	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★½

Overall ★★★★★



Pentax 645Z

£6,800 / $8,500

Take a step up to medium-format

This might not be what you'd consider a 'budget' option, but if you caught our group test of medium-format cameras in issue 159, you'll have seen that most of them cost upwards of £20,000 ($30,000). The Pentax 645Z is built much more like a 35mm SLR, with an integrated design. It also handles much more like a typical SLR, with all the usual shooting, metering and exposure modes that we've come to expect in modern cameras.



Shooting mode dial The shooting modes include Sv (Sensitivity priority) and TAv (Shutter & Aperture Priority).

The biggest difference is that, while the competitors have full-frame sensors measuring 36 x 24mm, the Pentax ups the size to 44 x 33mm and has the largest pixel count at 51.4MP. This considerably outstrips even the Nikon D810. As a less desirable function of going medium-format, the Pentax is much bigger and boxier than the other SLRs in the group. It's also the heaviest body at 1,550g, and compatible lenses tend to be bigger than for smaller SLRs.

The 27-point autofocus system (with 25 cross-type points) might look a little modest compared with other SLRs in the group, but bear in mind that most medium-format cameras only have a single AF point at the centre of the frame.

PERFORMANCE

The comparatively large, ultra-high resolution image sensor makes for a slow maximum drive rate of just 3fps, and autofocus speed is sluggish. The Pentax isn't ideal for tracking fast-moving targets or shooting rapid bursts of images but its strengths are the reduced depth of field that's made available by medium format and its spectacular 51.4MP resolution.

Around the back... Pentax 645Z

Controls are tightly packed for such a big camera



Viewfinder The medium-format viewfinder gives a huge viewing image – but only 98% frame coverage.

LCD screen The Pentax features a tilting screen with a high 1,037k-dot resolution.

Upper controls Rear dials either side of the viewfinder give access to autofocus modes and Live View/ video selection.

Right-hand controls Compared with most medium-formats, direct access controls are plentiful.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★★★★

Overall ★★★★☆



Sony Alpha 7R

£1,340 / $2,100

An opposite design philosophy to the Pentax

The Sony A7R is amazingly small and slim. At just 407g, the Sony manages to pack in a full-frame image sensor, with a hefty pixel count of 36.4MP. In this respect it matches the Nikon D810, while exceeding its maximum standard sensitivity, at ISO 25,600 compared with the Nikon's ISO 12,800. Mind you, the Sony has no expanded ISO range. Another similarity with the D810, as well as the Pentax 645Z, is that all three cameras omit an anti-aliasing filter.



Exposure compensation dial +/-3 stops of exposure compensation are available from the top-panel dial.

Compact system cameras are often criticised for their lack of an optical viewfinder. However, while the electronic 'finder built into the Sony can make you feel a little detached from the scene, it has a high 2,400k resolution and excellent colour rendition, with the bonus of real-time previews of the effect of exposure settingse. Due to space restrictions, there's no top-panel info screen, but a wealth of information is available on the rear LCD. It's not a touchscreen, but it does have a tilt facility. The camera also sports built-in Wi-Fi and Near Field Communication, which are lacking in all other cameras on test.

The Sony A7R is beautifully made and feels solid and sturdy. Buttons and switches are of high quality, but can feel a bit small and fiddly.

PERFORMANCE

Based on a contrast-detection system, autofocus is slower than in the Canon and Nikon bodies, although it's of a similar speed to the Pentax. The maximum drive rate is the slowest here, at 1.5fps, although you can boost this to 4fps in Speed Priority mode, which cancels autofocus and metering between successive shots in a sequence.

Around the back... Sony Alpha 7R

There's most of what you need here



Viewfinder The high-quality OLED viewfinder has a generous 2,400k-dot resolution.

LCD screen The 3.0-inch, 921k-dot screen is impressively anti-reflective and has a handy tilt facility.

AF/MF AEL A lever for auto or manual focusing selection surrounds the Sony's exposure lock button.

4-way pad This gives access to drive mode, display options and white balance, also doubling as a rotary controller.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★½	★★★★½
IMAGE QUALITY	**VALUE**
★★★★★	★★★★½

Overall ★★★★½

IMAGE QUALITY IN FOCUS

OUTDOOR

CANON EOS 5D MARK III



Metering and auto white balance are reliable and consistent, colour rendition is beautiful and there's great detail through the tonal range.

CANON EOS 1D X



In this test shot, the 1D X gave a marginally darker image than the 5D Mk III, with slightly deeper shadows, but there's very little difference.

NIKON D810



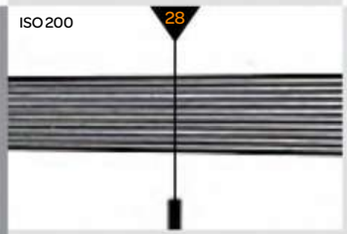
The ability to capture the very fine details in landscape shots is impressive, and the images tend to be very vibrant.

NIKON D4S

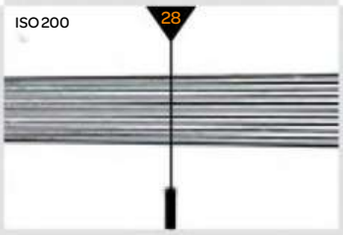


The D4S isn't capable of capturing quite as much fine detail as the D810 but otherwise, image quality for landscapes looks virtually identical.

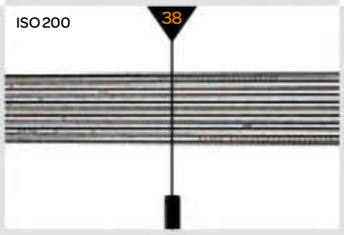
RESOLUTION



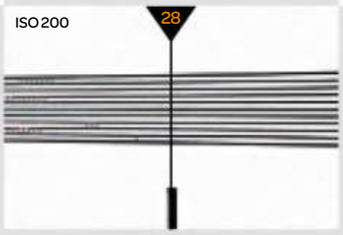
It's beaten by the Nikon D810, Pentax 645Z and Sony A7R, with their higher-resolution sensors, but matches the 1D X and Nikon D4S.



Results are practically identical to the 5D Mk III through most of the sensitivity range, but resolution is a little lower at ISO 50 and ISO 6,400.



Fabulous lab scores for resolution ease ahead of the Sony A7R, rivalling the Pentax medium-format camera through most of the ISO range.

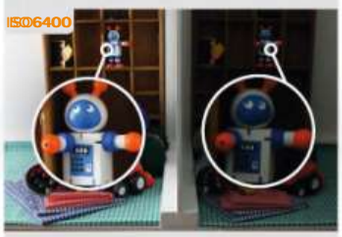


It's a pretty close match to the two Canon cameras for resolution, but the D4S better scores better at ultra-high sensitivities above ISO 51,200.

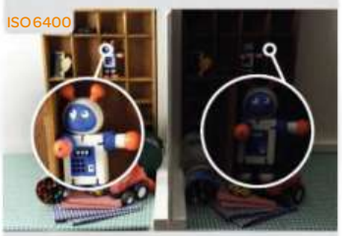
NOISE



Image noise is low, even at very high sensitivity settings. Performance is noticeably better than the Nikon D810 in this respect.



Again, there's excellent retention of fine detail with very little visible image noise at very high ISO settings, as with the 5D Mk III.

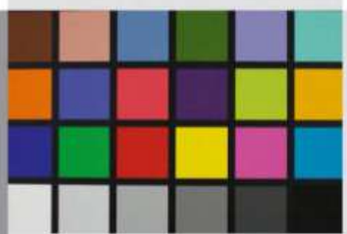


Nikon claims noise reduction is improved compared with the original D800, but it's more visible than in images from the Canons.



Noise is rather less noticeable at high ISO settings than from the D810, but is still more visible than from both Canon cameras.

COLOUR ERROR



With excellent colour fidelity, the 5D Mk III gives very accurate results in wide-ranging conditions, both indoors and outdoors.



Colour rendition is very pleasing and entirely natural, with excellent levels of accuracy being enabled by auto white balance.



Lab scores for colour accuracy are particularly good, but auto white balance can stray to the warm side under direct sunlight.



Colour reproduction is practically the same as from the D810, with good accuracy on the whole but a tendency to slight warmth in sunny scenes.

IMAGE TEST VERDICT

There's very little to choose between image quality from this camera and the more expensive 1D X. Both are equally excellent.

★★★★★

IMAGE TEST VERDICT

Beautiful image quality is assured in practically any shooting conditions, from bright sunny landscapes to gloomy interiors.

★★★★★

IMAGE TEST VERDICT

The D810 delivers stunning image quality with incredible fine detail but image noise can be an issue in low lighting conditions.

★★★★★

IMAGE TEST VERDICT

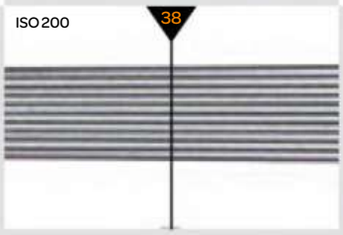
Great all-round image quality from Nikon's flagship camera. It can't match the D810 for resolution but delivers cleaner low-light images.

★★★★★

PENTAX 645Z



The Pentax goes to the dark side a little with its metering. There's seldom any risk of blown highlights, but shadows can be very dense.



Putting its medium-format sensor to use, the Pentax delivers excellent resolution with a sensitivity range that stretches further than the Nikon D810.



The increase in image noise at high ISO settings follows a similar path to the Nikon D4S. Results are very good, but the Canons have the edge.



There's a slight coolness to the colour balance of images from the Pentax, compared with all other cameras in the group.

IMAGE TEST VERDICT

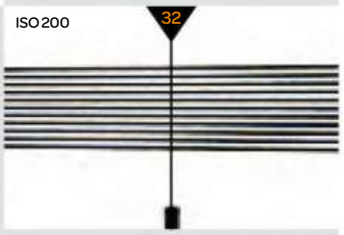
The 645Z packs a punch in terms of resolution but images can look a cool and under-exposed compared with those from competing cameras.

★★★★☆

SONY ALPHA 7R



There are striking similarities to both Nikons in the way the Sony handles landscape shots, especially in terms of colour and contrast.



The Sony loses out to the Nikon D810 and Pentax 645Z in the resolution stakes but remains ahead of all other cameras in the group.

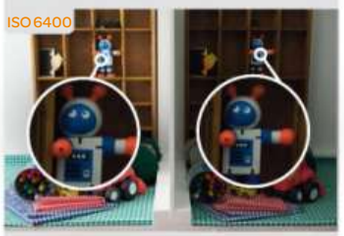


Image noise at medium to high ISO settings is noticeably less than with the Nikon D810, despite the cameras both having the same pixel count.



Auto white balance often gives the same touch of warmth to bright sunny scenes that's delivered by the Nikon cameras.

IMAGE TEST VERDICT

It's may be a small and compact camera, but it's really big on image quality, rivalling some of the best SLRs on the market.

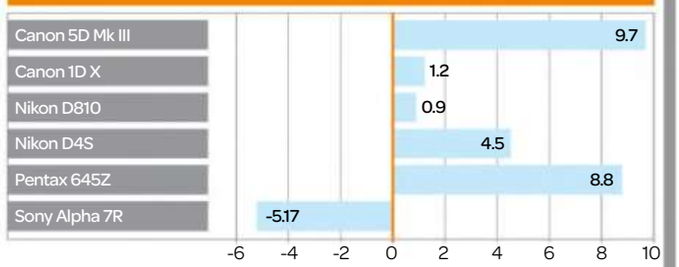
★★★★★

CAMERA BENCHMARKS

How the cameras fare in our lab tests

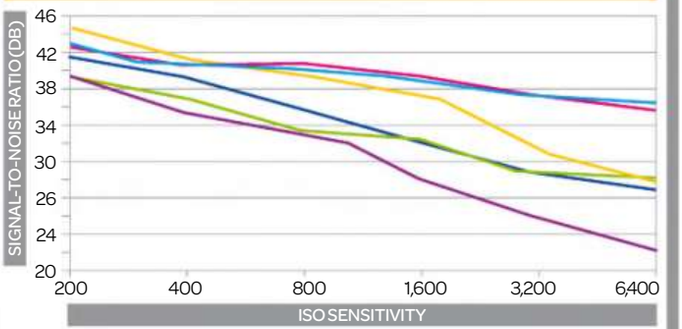
For retaining the utmost fine detail, the Pentax 645Z edges ahead of the Nikon D810, especially when shooting in JPEG quality mode – although there's little to choose between them in raw mode. The Sony A7R has less resolving power but stays ahead of the Canon 1D X, Canon 5D Mark III and Nikon D4S. The upside for both Canon cameras is that they deliver noise-free images in low lighting conditions, even at high ISO settings.

RAW COLOUR ERROR* Scores closer to zero are better



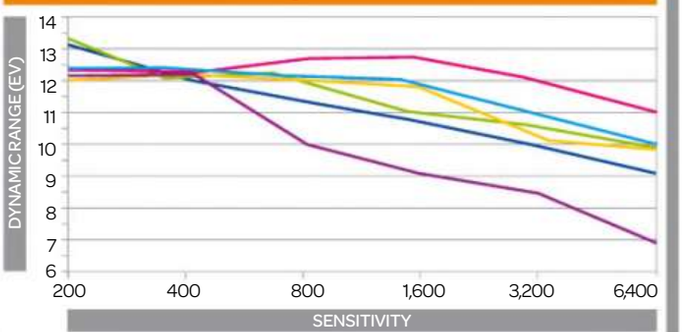
COLOUR ERROR RESULT: The Nikon D810 scores best for colour accuracy, just ahead of the Canon 1D X. Colours from the Pentax 645Z look rather cool.

RAW SIGNAL-TO-NOISE RATIO* Higher scores are better



NOISE RESULT: Both Canons lead for most of the way, borne out by very clean high-ISO images. The Nikon D810 comes bottom of the pile.

RAW DYNAMIC RANGE* Higher scores are better



DYNAMIC RANGE RESULT: Most cameras give good dynamic range even at high ISO settings, the Canon 1D X leading, while the Nikon D810 lags behind.

KEY
Canon 5D Mk III
Canon 1D X
Nikon D810
Nikon D4S
Sony Alpha 7R
Pentax 645Z

*** Raw results use images converted to TIFF**



THE DIGITAL CAMERA VERDICT

CANON 1D X OUTGUNS THE COMPETITION

The 1D X is the consummate professional camera and an unbeatable all-rounder

From the super-sized Pentax 645Z to the super-skinny Sony A7R, there are cameras great and small in this test group. The Canon 1D X is undeniably one of the bigger bodies but, for our money, it's also the most versatile. Its super-fast drive rate leaves the Pentax and Sony cameras standing, making it ideal for action sports and wildlife photography.

It's equally adept at portrait and fashion photography, with a well implemented vertical grip that makes handling a delight. It edges ahead of the Nikon D4S in pixel count, while delivering noise-free image quality at very high ISO settings.

Taking a downward step in size and purchase price, the most obvious choice is between the Canon 5D Mk III and the Nikon D810. Again, we prefer the handling and the overall image quality of the Canon. However, the Nikon wins hands-down if you prefer a higher pixel count at the expense of noisier images at high ISO settings. The Sony A7R also delivers superb image quality. It's amazingly compact, compared with all other cameras in the group, and has matured into a serious contender, now that range of high-quality supporting lenses has grown.

Above Canon's top-spec SLR is jam-packed with features and beautifully built.

At the other end of the scale, the Pentax 645Z is the most expensive camera in the group, but is nevertheless very good value in the medium-format stakes.

HOW THE CAMERAS COMPARE



	Canon EOS 5D Mark III	Canon EOS 1D X	Nikon D810	Nikon D4S	Pentax 645Z	Sony Alpha A7R
Website	www.canon.co.uk	www.canon.co.uk	www.nikon.co.uk	www.nikon.co.uk	www.pentax.co.uk	www.sony.co.uk
Street price (body)	£2,250 / $2,500	£4,850 / $6,000	£2,400 / $3,000	£4,500 / $6,000	£6,800 / $8,500	£1,340 / $2,100
Image sensor	22.3MP, 36 x 24mm	18.1MP, 36 x 24mm	36.3MP, 36 x 24mm	16.2MP, 36 x 24mm	51.4MP, 44 x 33mm	36.4MP, 36 x 24mm
Image processor	Digic 5+	Dual Digic 5+	Expeed 4	Expeed 4	Prime III	Bionz X
Low-pass filter	Yes	Yes	No	Yes	No	No
Lens mount	Canon EF	Canon EF	Nikon F	Nikon F	Pentax 645AF2	Sony E-mount
Viewfinder	Pentaprism, 0.71x, 100%	Pentaprism, 0.76x, 100%	Pentaprism, 0.7x, 100%	Pentaprism, 0.7x, 100%	Pentaprism, 0.85x, 98%	Electronic, 0.71x, 100%
ISO range (expanded)	ISO 100-25,600 (50-102,400)	ISO 100-51,200 (50-204,800)	ISO 64-12,800 (32-51,200)	ISO 100-25,600 (50-409,600)	ISO 100-204,800	ISO 100-25,600
Autofocus points	61-point (41 cross-type)	61-point (41 cross-type)	51-point (15 cross-type)	51-point (15 cross-type)	27-point (25 cross-type)	Contrast AF
Shutter speeds	1/8,000–30 sec, Bulb	1/8,000–30 sec, Bulb	1/8,000–30 sec, Bulb	1/8,000–30 sec, Bulb	1/4,000–30 sec, Bulb	1/8,000–30 sec, Bulb
Max burst rate	6fps	12 (14fps no AF/AE)	5fps (7fps crop)	11fps	3fps	1.5fps (4fps no AF/AE)
Buffer capacity (RAW)	18 shots	38 shots	23-58 shots	36-176 shots	25 shots	15 shots
Video - max resolution	1080p (24-30fps)	1080p (24-30fps)	1080p (24-60fps)	1080p (24-60fps)	1080p (24-30fps)	1080p (24-60fps)
LCD screen	3.2-inch, 1,040k	3.2-inch, 1,040k	3.2-inch, 1,229k	3.2-inch, 921k	3.2-inch, 1,037k, tilt	3.0-inch, 921k, tilt
Memory	1 x CF, 1 x SD/HC/XC	2 x CF	1 x CF, 1 x SD/HC/XC	1 x CF, 1 x XQD	2 x SD/HC/XC	MS or SD/HC/XC
Wi-Fi	No	No	No	No	No	Wi-Fi + NFC
Body materials	Magnesium alloy	Magnesium alloy	Magnesium alloy	Magnesium alloy	Magnesium alloy	Magnesium alloy
Body (W x H x D)	152 x 116 x 76mm	158 x 164 x 83mm	146 x 123 x 82mm	160 x 157 x 91g	156 x 117 x 123mm	127 x 94 x 48mm
Weight	950g	1,340g	980g	1,350g	1,550g	407g
Battery life (CIPA)	950 shots	1,120 shots	1,200 shots	3,020 shots	650 shots	340 shots
FEATURES	★★★★½	★★★★★	★★★★½	★★★★★	★★★★½	★★★★½
BUILD QUALITY	★★★★★	★★★★★	★★★★★	★★★★★	★★★★½	★★★★½
IMAGE QUALITY	★★★★★	★★★★★	★★★★★	★★★★★	★★★★½	★★★★★
VALUE	★★★★★	★★★★½	★★★★½	★★★★½	★★★★★	★★★★½
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★½	★★★★½



1st CANON EOS 1D X

What's good: Up to 14fps shooting; 61-point autofocus system; intuitive ergonomics.

What's bad: Big and heavy; it lags behind many current cameras in pixel count.

We say: The best and most well-rounded camera on the market, the 1D X delivers stunning image quality in all sorts of conditions, and its design ensures natural handling. It has a super-fast drive rate, excellent high-ISO performance, and is incredibly accurate in terms of autofocus, metering and auto white balance.

★★★★★



2nd NIKON D4S

What's good: 11fps shooting; 51-point autofocus; built-in vertical grip.

What's bad: Auto white balance can be a bit variable; relatively low 16.2MP resolution.

We say: There's very little to choose between this and the 1D X, but the Canon just wins out.

★★★★★

Digital Camera

PREMIUM CAMERA TEST RANKINGS

Here's how we've ranked these six premium cameras



3rd CANON EOS 5D MK III

What's good: Smaller, lighter and cheaper than the 1D X; same great autofocus and image quality.

What's bad: Loses out to the Nikon D4S and Sony A7R in terms of pixel count.

We say: If clean high-ISO images are more important than pixel count, buy the 5D Mk III.

★★★★★



4th NIKON D810

What's good: Spectacular resolution reveals amazing levels of detail; vibrant image quality.

What's bad: Slightly pedestrian 5fps drive rate; low-light images can be noisy at high ISO settings.

We say: It rivals medium-format cameras for resolution, and handling is more natural.

★★★★★



5th PENTAX 645Z

What's good: 51.4MP medium-format image sensor; availability of a really tight depth of field.

What's bad: Big; heavy and cumbersome; slow 3fps drive rate; sluggish autofocus.

We say: A great value buy if you're into medium-format, but it's not one for the road.

★★★★☆



6th SONY ALPHA 7R

What's good: Small for a full-frame camera; big pixel count; gorgeous image quality.

What's bad: Autofocus system is fairly slow and the maximum regular drive rate is only 1.5fps.

We say: It's a brilliant little camera, but it's not suited to rapid, fast-action shooting.

★★★★☆



> THE SPECS	
Sensor	1 APS-C format CMOS sensor with 24.2 million effective pixels
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC
Viewfinder	Optional extra (EVF-DC1)
Video	Full HD at 30, 25 or 24fp
ISO range	100-12,800 (ISO25,600 exp)
Autofocus points	49
Max burst rate	4.2fps
Screen	Touch-sensitive 3-inch 1,040,000-dot LCD
Shutter speeds	30-1/4000sec, Bulb
Weight	366g (with card and battery)
Dimensions	110.9x68x44.4mm
Power supply	Li-ion Battery LP-E17

CSC Canon EOS M3 > £599 with 18-55mm kit lens> www.canon.co.uk

Canon EOS M3

Has Canon finally got serious about compact system cameras? **Angela Nicholson** tests the new EOS M3

Canon's first compact system camera (CSC), the EOS M, seemed very good on paper, but at launch it was expensive and let down by an autofocus system that was slow and prone to hunting. Firmware upgrades improved the autofocus performance significantly and the price fell with the passage of time, but the damage was done.

Now, in the UK at least, we have the M3 (it's not being released in the USA). Like the M, the M3 uses an APS-C format sensor, but this time it's the same 24.2Mp sensor and Digic 6 processor combination as is found in the 750D and 760D. This allows a native sensitivity range of ISO100-12,800 with an expansion setting of ISO25,600 – the same as the original M, but with a higher pixel count.

The M3 also has Canon's latest 49-point Hybrid CMOS AF III autofocus system, which is claimed to bring a mighty 6x speed increase over the original EOS M after the firmware upgrades.

As it's aimed at enthusiasts, there are aperture priority, shutter priority and manual exposure modes, along with a collection of automated options that are helpful for less-experienced photographers.

BUILD AND HANDLING

In looks the EOS M3 sits between a G-series compact camera, like the Canon G16, and an EOS DSLR, like the Canon 100D. Thanks to its steel, magnesium alloy and polycarbonate resin construction it has a nice solid feel, which gives you confidence that it will survive regular use. The control layout is similar, but not identical, to the G16's and it's really easy to use, with touch-screen control, along with a healthy array of direct control buttons and dials.

The touch-screen LCD can be tilted up through 180 degrees and downwards through 75 degrees for easier landscape-format shooting from high or low angles. Reflections are an issue in direct sunlight, but with the screen set to its maximum brightness it is still possible to compose images. It's a shame that Canon hasn't built in an electronic viewfinder, but there is an optional one available, which slots into the camera's hotshoe.

The M3 shoehorns a 24.2Mp APS-C sensor into a mirrorless body

The camera back is dominated by a touch-screen LCD



PERFORMANCE

While the EOS M3 is capable of capturing lots of detail, it isn't always as easy to do so as you might like. The problem is often down to the focusing system. In many cases it focuses the lens very quickly and accurately, but there are other times when it indicates that the subject is sharp when it clearly isn't – even though the subject completely fills the

WHAT'S THIS? Find out how we test on page 6



selected autofocus box.

We also found that the EF-M 18-55mm f/3.5-5.6 IS STM kit lens doesn't get the best from the sensor, and if you want to capture the level of detail that we know is possible from it, you need to swap to a better optic, like the EF-M 22mm f/2 STM.

Generally, the EOS M3 controls noise well throughout the native sensitivity range, ISO100-12,800, with the top value giving decent results that withstand viewing at A4 size, provided you don't mind a little fine-grained noise. Happily, there's no banding, clumping or problems with colour shifts. As usual, raw files produce the best results, allowing you to find a balance between noise and detail visibility.

In other respects the M3 gives a good account of itself, generally delivering well-exposed images with pleasant colour. The metering and white balance systems perform as superbly as we have come to expect from Canon EOS cameras.

If it's weren't for the unreliable autofocus system, the M3 would score much higher.

Generally, the EOS M3 controls noise well throughout the native sensitivity range

FEATURES

01 Wi-Fi and NFC connectivity allow fast connection to compatible tablets and smartphones.

02 A pop-up flash (GN 5, ISO100) and hotshoe tops off a comprehensive specification list.

03 An optional EVF-DC1 viewfinder slips into the hotshoe. It adds about £100 to the cost of an M3 and 18-55mm lens kit.

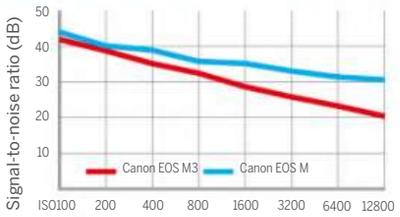
04 The M3 has the EF-M lens mount. There are only four EF-M lenses to date, but an EF-EOS M adaptor enables EF and EF-S lenses to be mounted.

05 This control dial is easy to reach and use, to set aperture or shutter speed, depending on the exposure mode.

06 This enables speedy adjustments to be made to exposure compensation.

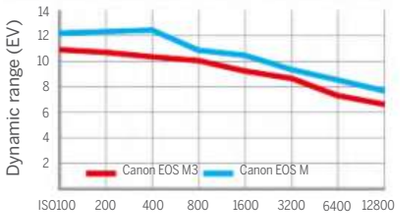
EOS M3 vs EOS M

RAW* SIGNAL-TO-NOISE RATIO



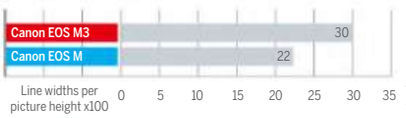
The M3's Raw files generally have a bit more noise than the original M's, but this enables them to reveal more detail

RAW* DYNAMIC RANGE



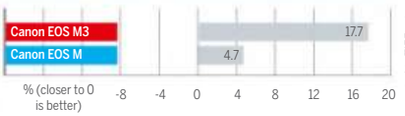
The M3's dynamic range scores are good for low to mid-range sensitivity settings, but don't capture as many tones as the M

RAW* RESOLUTION (AT ISO200)



The benefit of increasing the pixel count to 24.2Mp is that the M3 can resolve much more detail – with a good lens

COLOUR ERROR



The M3 produces quite highly saturated images in the Standard Picture Style; they look good straight from the camera

* Raw files are converted to TIFF using Canon's Digital Photo Professional software



JPEGs produce highly saturated colours that generally look great straight from the camera



The 24.2Mp sensor is able to resolve plenty of detail, but the supplied EF-M kit lens is a little lacklustre

Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★☆☆
IMAGE QUALITY	**VALUE**
★★★☆☆	★★★☆☆

Overall ★★★★★

WE SAY: Although it is clearly very capable, the M3 is let down by its autofocus system, the lacklustre kit lens and the restricted range of directly compatible lenses. A built-in viewfinder wouldn't go amiss, either.



> THE SPECS	
Sensor	18MP APS-C (22.3x14.9mm) CMOS sensor
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC
Viewfinder	Optical viewfinder, 95% coverage, 0.8x magnification
Video resolution	Full HD (1,920x1,080 pixels) at 30, 25 or 24fps
ISO range	ISO 200-6,400 (expandable to 12,800)
Autofocus points	9
Max burst rate	3fps
LCD screen size	3-inch; 460,000 dots
Shutter speeds	1/4,000-30 sec
Weight	480g (inc battery and memory card)
Dimensions	129.6x99.7x77.9mm
Power supply	BLS-5 Li-Ion battery

SLR Canon 1200D > £319 with 18-55mm lens > www.canon.co.uk

Bag a bargain

Canon's EOS 1200D is certainly excellent value for money – but what are the images like? **Amy Davies** finds out

The new Canon EOS 1200D replaces the 12-million-pixel EOS 1100D, which is now three years old, and sits just below the ultra-small 100D as the first camera in Canon's line-up. The 1200D is less a major overhaul of its predecessor than a gentle upgrade. In terms of specifications, it seems like Canon has played it relatively safe. It features an 18-million-pixel sensor, and has a Digic 4 processor, which is two generations old.

FEATURES

Aimed squarely at the entry-level user, the 1200D comes packed with several automatic modes, including Scene Recognition Auto and some creative modes to give images a different look. Unlike the 100D, these filters can only be applied post-shooting, rather than as the image is being captured.

On the back of the camera is a 460,000-dot, three-inch display, which is neither touch-sensitive nor tilting. It is joined by an optical viewfinder that offers a 95% field of view.

Full HD video recording is possible, which means that the whole Canon digital SLR line-up now has the capacity to record high-resolution movies. You can also take full manual control of video recording, which is nice to see in an entry-level model.

The camera's native sensitivity run starts at ISO 100, rising up to ISO 6,400, but this is expandable up to 12,800. As the camera doesn't use the most recent image processor, it will be interesting to see how well it copes with noise in high-sensitivity and low-light situations.

There are nine autofocus points, with only the central point being cross-type for extra sensitivity. The camera can shoot at up to three frames per second, which doesn't compare particularly well with the Nikon D3300's 5fps, for example.

Canon hasn't included Wi-Fi or NFC connectivity for the 1200D. Although that's perhaps offputting for those coming from a smartphone background, it's to be expected at this price point. It is compatible with Wi-Fi-equipped SD cards, though, if you want to expand its capability.

Battery life is claimed to be up to 500 shots, which is a reasonable offering. Again, though, it doesn't compete too well with the Nikon D3300, which is rated at over 700 shots per charge. But although the 1200D goes head to head with the D3300, with them both sitting in the same position in each other's respective line-ups, the 1200D, for now at least, is much cheaper.

Above With a decent kit lens included, the 1200D looks great value

BUILD AND HANDLING

Canon has given the 1200D an improved look and feel compared with the 1100D. It's now more in line with something like the 700D, which sits ahead of it in the line-up.

As there is no touchscreen on the 1200D, every element of camera control is done via the physical buttons, unlike some of the other SLRs in Canon's range (such as the 100D and the 700D). Despite it being an entry-level mode, there are still a decent number of those buttons on the back of the camera, including dedicated buttons for white balance and sensitivity (ISO).

As can be found on all Canon digital SLRs, there is a mode dial on top of the camera to enable quick changes between the different shooting modes on offer. There's a lot of choice on this dial, including the



The 1200D's textured coating and chunky grip help you get a firm hold

FEELING TREATED



There's a good range of direct control buttons on the 1200D



Successful composition through the viewfinder can be tricky

FEELING CHEATED



The rear screen is neither touch-sensitive nor articulating

Zooming in on the... Canon EOS 1200D

A quick tour of the camera's key features



Use this button to start shooting with Live View – but note that focussing speeds will be drastically reduced



The left-hand button here allows you to change the active AF point, of which nine are available



Tap this Q button to quickly access up to 12 settings you'll commonly use, such as metering



Canon hasn't made any drastic changes to the user interface: it's simple and does the job



standard exposure modes, as well as fully automatic and the various scene modes the camera offers.

Unlike with the 100D, in order to activate video recording, you need to set the mode dial to this setting. The Live View button on the back of the camera can then be used to start the recording off.

By pressing the quick menu button, labelled as Q, you can quickly scroll to 12 different settings displayed on the screen and change them using the scrolling dial. So, for instance, you can navigate to the metering setting, then scroll with the dial to change from general-purpose to spot metering.

> "The 1200D is less a major overhaul of its predecessor than a gentle upgrade"

There aren't many in the way of creative options to be found on the 1200D – there's no panoramic mode of the kind you'll find on the D3300 – but you can experiment with Picture Styles before shooting. There are a number of presets, such as Landscape and Monochrome, which you can modify, for instance by upping the contrast. The benefit here is that you can shoot in raw format to keep an unaltered version of the image should you need it.

Along with that option, you can also edit photos in-camera with certain filter effects. These are fun to experiment with – and you'll have the original version of the file too.

There will be those who prefer optical viewfinders to electronic. Although the 1200D's optical finder is bright and clear, the fact that it only offers a 95-per-cent field of view can be problematic as stray artefacts can creep into compositions.

Meet the rivals...

See how the EOS 1200D stands up against the competition



Nikon D3300
£499 (body only)
With its high resolution, the D3300 satisfies those who crave megapixels without skimping on image quality.
Reviewed: page 78



Canon EOS 100D
£279 (body only)
The smallest and lightest SLR on the market and a fantastic choice for the first-time SLR buyer.
Reviewed: page 46



Fujifilm X-A1
£349 with 18-50mm lens
The X-A1 CSC scores well for build, functionality and price, which makes the slight dip in image quality from the X-M1 palatable.
Not reviewed

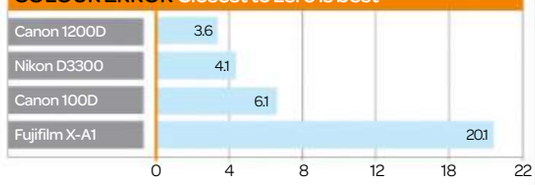
PERFORMANCE

Image quality from the 1200D is very good, as we've come to expect from Canon cameras. Colours are bright and punchy without being overly vibrant. The 1200D maintains Canon's propensity towards pleasingly warm tones that stay just on the right side of accurate.

You can use Picture Styles to experiment with how colours appear, which is useful if you want to increase vibrancy or contrast. Using the

CAMERA BENCHMARKS
How does the EOS 1200D measure up?

COLOUR ERROR Closest to zero is best

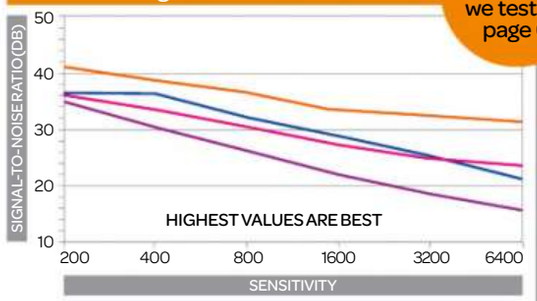


COLOUR ERROR RESULT: This test shows the 1200D is reasonably close to accurate, erring on the side of producing warm tones.

KEY: Canon 1200D, Nikon D3300, Canon 100D, Fujifilm X-A1

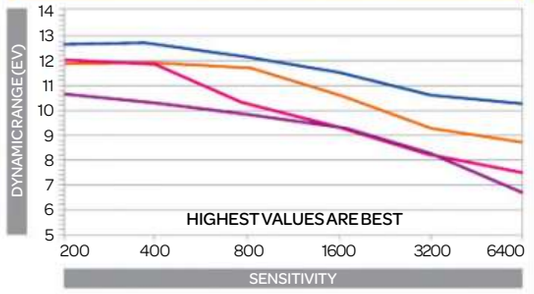
WHAT'S THIS? Find out how we test on page 6

RAW NOISE* Highest values are best



NOISE RESULT: The graph suggests the 1200D is a poor performer, but this could be due to Canon prioritising detail resolution.

RAW DYNAMIC RANGE* Highest values are best



DYNAMIC RESULT: The 1200D puts in a consistent performance across the sensitivity range, although the X-A1 does better.

OVERALL BENCHMARK RESULT
JPEG images have a stronger signal-to-noise ratio result than the raw format images, reflecting the fact Canon is applying its own noise-processing to JPEG images in-camera. For dynamic range in JPEG images, the 1200D beats its predecessor by a good margin, but is closely matched with the Nikon D3300.

*** Raw results use images converted to TIFF**



Above right Experiment with Picture Styles in-camera to shoot in monochrome

Automatic setting is good for everyday shooting scenarios, while the Monochrome setting gives pleasing black-and-white images.

Compared to the Nikon D3300's 24.2 million pixels, 18MP may seem fairly modest, but the 1200D is capable of resolving a good amount of detail. Our lab tests indicate that the 1200D does well for detail resolution, favouring it over noise reduction, especially in raw files.

If you examine images at their actual size, it's possible to see some image smoothing at mid-range sensitivities, but it's not something that is troubling at printing sizes of A3 or below. At low sensitivities, such as ISO 100 or 200, detail is kept well.

The Nikon D3300 has a higher resolution and no optical low-pass filter, so it is better placed to capture detail. But the difference is probably only something you'll notice if you make huge prints or tend to shoot photographs with lots of fine detail in them.

Noise is generally well controlled throughout the sensitivity range. At reasonably high sensitivities, such as ISO 800, noise is very low, which is great to see. Happily, detail is also kept pretty well at these sensitivities. There is more noise visible at ISO 1,600, although the noise reduction system does a good job of keeping it to a minimum. There is some detail lost if you examine an image at actual size, but it's not likely to be a problem for the typical user.

More detail is visible in raw files with the noise reduction switched off. This means you can apply your own processing using Canon's Digital Photo Professional software, which comes with the camera, depending on whether you want to prioritise detail resolution or lack of noise.

Like other Canon cameras, the 1200D uses Canon's iFCL metering system. Generally, this does a good job of producing well-balanced exposures, but it can be problematic to use when you're shooting a high-contrast scene.

The camera's automatic white balance system does an excellent job in most situations. While shooting under artificial lighting, the camera errs ever so slightly towards warmer tones, but it's generally not too displeasing. You can always set a more specific white balance setting.

Processing speed can sometimes be a little lacklustre. For instance,



Tech Briefing
Canon EOS Companion app



While Nikon includes an in-camera guide to taking photographs in the D3300, Canon has created an app that can guide you through the basics of using your camera, along with giving you hints, tips and inspiration for photography itself.

EOS Companion is available for Android and iOS. It includes a fun game, which asks you to select a random theme ('Clothes', for example) and an approach (like 'Happy'), which can be a good way to challenge yourself. Exercises are also available to show you more conventional techniques, such as making the subject stand out. Lens tutorials are useful when you want to move past the kit lens.

if you take a couple of shots in quick succession, waiting for them to appear on the back display can take a frustrating few seconds. This is probably due to the older processor. In fairness, it's also something that is problematic with the Nikon D3300.

Autofocussing speeds are generally fairly good when shooting in bright light. The kit lens takes a little longer to focus than some other prime lenses, and because it's not hyper- or ultrasonic, it can seem quite loud if you're shooting in a quiet environment. It's also worth noting that switching to Live View significantly reduces the speed at which the camera can focus, so it's only really recommended for shooting still or nearly still subjects. It can be useful for shooting macro subjects, where the larger view is useful for pinpoint-accurate focussing.

Above Colours are bright and punchy straight from the camera, displaying a pleasing warm tone

Below The top controls follow the classic Canon layout



Going back to the kit lens for a moment, the 18-55mm f/3.5-5.6 optic supplied with the 1200D is a decent all-round performer for your first lens. By shooting at mid-range apertures, such as f/8, we can assess the sharpness of the lens. Here the kit lens puts in a good performance, producing reasonably sharp images across the frame.

Although battery life isn't quite as good as the quoted Nikon D3300 battery life, it still puts in a very good performance. We shot for a few hours at a time, and the battery indicator was still displaying as full or nearly full by the end of the day. It's unlikely you'll need a second battery unless you plan to shoot with it for several days at a time without charge.

VERDICT

Three years is a long time to wait for an upgrade of this kind of camera, so we can't help but be a little disappointed not to see something a little more revolutionary in the 1200D's specifications. That said, image quality is great, if not a massive leap forward from the 1100D.

Detail resolution is good, but not quite as good as the Nikon D3300, which has a higher-resolution sensor and no anti-aliasing filter. Unless you're planning to make huge prints, though, it's not something that should be too much of an issue for the majority of subjects.

There's no touchscreen on the 1200D, but thanks to the number of buttons available on the body, you shouldn't feel it's a feature that is desperately lacking – and its absence helps to keep the price low.

Digital Camera

FEATURES	BUILD/HANDLING
★★★☆☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★★★★

Overall ★★★★☆

WE SAY: Canon has produced a reliable camera capable of creating some beautiful images. If you're in the market for your first digital SLR, and you're OK with a no-frills purchase, the 1200D is a great option.



> THE SPECS	
Sensor	18 million pixel APS-C CMOS sensor (22.3x14.9mm)
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC
Viewfinder	Optical viewfinder, 95% coverage, 0.87x magnification
Video resolution	Full HD (1920x1080)
ISO range	100-12800 (25600 extendable)
Autofocus points	9
Max burst rate	4fps
LCD screen size	Touchscreen 3-inch, Clear View II TFT, approx 1040k dots
Shutter speeds:	1/4000 sec – 30 seconds
Weight	407g (body only, including battery and memory card)
Dimensions	116.8x90.7x69.4mm
Power supply	LP-E12 rechargeable Li-Ion battery

GSC Canon EOS 100D > £349 (with 18-55mm lens) > www.canon.co.uk

Tiny temptress

The EOS 100D is one diminutive SLR, but small doesn't necessarily mean beautiful. **Amy Davies** sees if size really does matter

Over the past couple of years, the interchangeable lens market has shifted significantly. Where once the DSLR was the undisputed king of the world, compact system cameras are making headway and threaten to steal their crown.

Although Canon finally introduced its own CSC in the shape of the EOS M last year, it failed to excite consumers, making little impact on now well-established brands like Panasonic and Olympus.

Perhaps in response to that, it has introduced the EOS 100D, the world's smallest and lightest DSLR. With a body size that's roughly 25% smaller, and 28% lighter, than the EOS 650D, Canon's engineers have really gone to town in miniaturising this model.

FEATURES

Pretty much all of the interior electronics have been shrunk down to fit the slimline chassis, while the sensor, although thinned, remains APS-C sized with 18 million pixels. It's a hybrid CMOS AF II sensor, the second generation of the type of sensor which was found in the 650D and EOS M. This has phase detection pixels to assist with autofocus when shooting video or using Live View.

Aiming this camera somewhere between the M and the 650D, there's a range of fun features on board. A number of digital filters have also been included, but you can now see how these effects will be rendered on the screen (when shooting in Live View) before the shot is taken.

Despite being roughly the same size as some of the compact system cameras on the market, the 100D still has room for an optical viewfinder that boasts 0.87x magnification and 95% coverage.

It has a smaller battery than the 650D, which Canon says is capable of around 380 shots. The in-built flash has a guide number of 9.4, compared with the 650D's number of 13.

Like the 650D and the EOS M, the 100D has a capacitive touchscreen. It is fixed, unlike the 650 and 700, which have articulating screens.

Although it is a lot smaller than Canon's other DSLRs, it still retains the standard EF-S lens mount, making it compatible with the company's huge range of optics, as well as those from third party manufacturers. Of course, unlike CSC optics, these remain quite large – in other words, don't expect the entire system to be smaller just because the 100D has been shrunk down.

Above The EOS 100D weighs just 407g, including the battery and the memory card

BUILD AND HANDLING

The first thing to obviously notice about the 100D is its size and weight. Compared with other entry-level cameras at this price point, it is indeed very small, with a body size roughly the same size as something like the Panasonic G5.

That said, despite its small size, the button layout of the camera is very good – it doesn't feel too cramped or awkward. There's a good chunky grip, making it feel secure in the hand, even when shooting one-handed. The majority of the buttons can be accessed with the thumb, and if you've ever used a Canon DSLR before, you'll be immediately at home.

A mode dial on top of the camera can be used to quickly flick between the different shooting modes, including fully automatic, fully manual and semi-automatic (such as Aperture Priority and Shutter Priority) modes.



You don't have to use the touchscreen if you prefer buttons

FEELING TREATED



Switch to video shooting mode to capture those off-the-cuff moments



Filters can't be shot in raw, but you can use Extra Effect Shot mode

FEELING CHEATED



Overall system size isn't reduced, due to large optic compatibility

Zooming in on the... Canon EOS 100D

A quick tour of the camera's key features



Despite its small size, Canon has managed to include a traditional optical viewfinder – good news for those who dislike EVFs



The 100D has 9 autofocus points, but only the centre is the sensitive cross-type



During Live View, the 100D uses hybrid autofocusing for better accuracy. You can preview digital filters when shooting in this way



Press this button to quickly access the Quick Menu to make changes to common settings, such as white balance

Here you'll also find Creative Auto, which is intended as a guide for beginner photographers, providing a way to achieve effects such as background blur, without using photographic language.

Movie mode, which used to be incorporated onto the mode dial of older Canon DSLRs, is now accessed via the on/off switch, to save pushing the mode dial all the way around.

As you might expect, there are fewer buttons on the back of the 100D to directly access certain settings. However, there is a button to access a Quick Menu, which enables you to scroll through the most commonly used settings, such as white balance and metering. You can use a combination of the arrow keys and the scroll dial on front of the camera to make changes or, if you prefer, a combination of the touchscreen and the scroll dial.

> "Everything that can be done via the touchscreen is also possible using physical buttons"

The touchscreen element perhaps really comes into its own when reviewing images, enabling you to swipe through shots and pinch to zoom to quickly check accurate focus. When shooting in Live View, you can also use the touchscreen to change the focus point and activate the shutter release – something which is particularly useful when creating movies, or using the camera from a more awkward position.

One of the great things about the 100D's design is that if you don't like the touchscreen, you don't have to use it. Everything that can be done via the touchscreen is also possible using physical buttons.

Canon has incorporated a number of digital filters on the EOS 100D, but accessing them is a little idiosyncratic. When operating in the majority of shooting modes, such as Aperture Priority, you can only use them when in Live View. You're also unable to shoot with them when raw format is enabled. Filters are more quickly accessible from the Creative Auto mode, but then you lose control over other elements, such as shutter speed.

A number of Picture Styles are included as presets, such as Landscape and Monochrome. These

Meet the rivals...

See how the EOS 100D stands up against the competition



Nikon D3200
£349 (with 18-55mm lens)
Almost the perfect SLR for beginners, there are minor niggles with the colour accuracy of the rear LCD.
Reviewed: issue 127



Sony a58
£359 (with 18-55mm lens)
This fixed translucent mirror DSLT is a good option for a first time interchangeable lens camera buyer.
Reviewed: issue 141



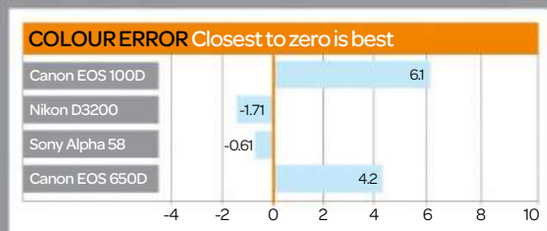
Canon 650D
£490 (with 18-55 mm lens)
With its touchscreen, Hybrid AF and other functions, it transforms the way you use an SLR.
Reviewed: issue 129

CAMERA SHOPPER

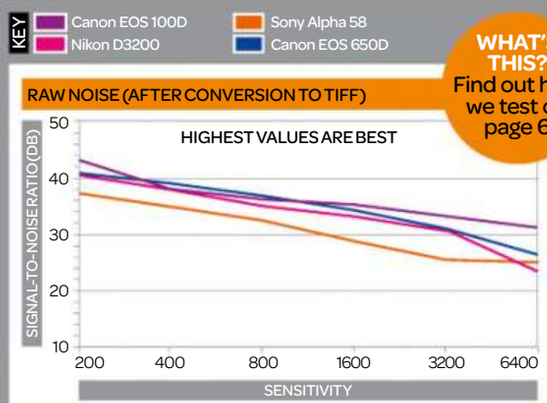
A DIGITAL CAMERA SPECIAL

SLR BENCHMARKS

See how the 100D fared in our tests

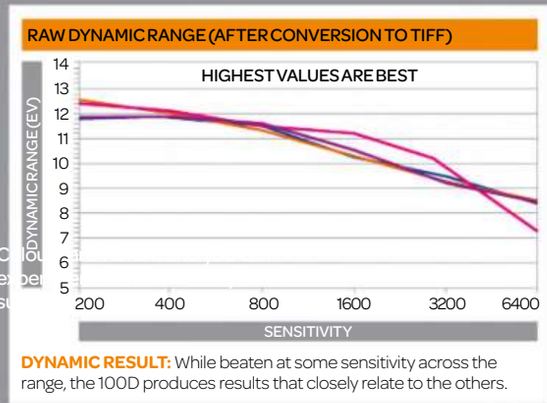


COLOUR ERROR RESULT: Good natural colour with a touch of vibrance, JPEGs direct from camera need very little enhancement.



NOISE RESULT: Despite its small size, the 100D not only compares well, but actually out performs all cameras here at higher sensitivities.

WHAT'S THIS? Find out how we test on page 6



DYNAMIC RESULT: While beaten at some sensitivity across the range, the 100D produces results that closely relate to the others.

OVERALL BENCHMARK RESULT

The 100D's JPEGs have a similar signal-to-noise ratio to those from the 650D, producing slightly greater ratios than the Nikon D3200 at every sensitivity and slightly weaker than the Sony a58 at ISO400 and above. The raw signal to noise ratio results are almost identical to the 650D and better than the D3200 and a58. Raw images show the a58 beats the 100D at the lowest sensitivities, but above ISO800 the Canon comes out on top.



Above That 18 million pixel sensor puts in a very similar performance to the EOS 650D

can be accessed via the quick menu, and unlike digital filters, they can be shot in both raw format and when using a standard shooting mode. There's also space for up to three of your own custom preset modes, if you want to create your own style, such as high contrast black and white.

PERFORMANCE

What the Canon engineers have achieved in shrinking down the key components of the DSLR is pretty remarkable, and we haven't been disappointed by the 100D's image performance. That 18 million pixel sensor is capable of resolving lots of detail, with minimal evidence of image smoothing at lower sensitivities.

Colours from the camera are also excellent, being nice and vibrant without going over the top. Having the ability to experiment with Picture Styles also gives you the opportunity to boost elements such as saturation if you think the scene requires it.

Automatic white balance does a good job in the majority of conditions, but it does tend to favour slightly warmer tones when faced with artificial lighting. Switching to a more appropriate white balance setting is quick enough, though, if you're not satisfied with its performance.

The 100D uses Canon's iFCL metering. Evaluative metering, as general-purpose metering is known on Canon DSLRs, is a reasonable performer, helping the camera to produce balanced exposures in the majority of conditions. However, if a scene has high contrast the camera struggles and it will under- or over-expose depending upon the brightness of the active AF point. In some ways it acts more like



Tech Briefing
Hybrid AF focusing



Debuted last year on the 650D, the hybrid autofocusing system works by combining phase detection and contrast detection for a system that is supposed to utilise the best factors of both. Generally, phase detection is quicker, while contrast detection more accurate. It works by incorporating certain pixels on the camera's sensor, working first to get the subject in focus, then fine-tuning with contrast detection. The hybrid autofocusing system is only used when shooting in Live View mode.

In the 100D, phase detection pixels now cover around 80% of the sensor's surface, which should make it better in terms of speed and tracking performance.

centreweighted, or even spot metering because the exposure is significantly skewed towards getting the subject under the AF point just right.

Noise performance is very good, with lots of crisp detail even at mid-range sensitivities such as ISO400. From around ISO1600, the amount of luminance and colour noise does increase, but it's not particularly noticeable at printing and normal web sizes. Even images shot at ISO3200 are usable in small sizes, though if you zoom in 100%, noise is apparent, along with a loss in detail.

Autofocus performance while shooting through the viewfinder is excellent, locking onto subjects quickly and easily. Only the central AF point is a cross-type, so this is more sensitive – you might want to keep the focus point to this central point and focus and recompose if you're attempting to capture rapidly unfolding action.

Above Shooting in Landscape picture style emphasises the greens and blues in a scene

Below The standard kit lens comes complete with STM autofocusing



Unfortunately, autofocus speed drops dramatically when using Live View, despite the hybrid autofocusing system. You could be waiting for a few seconds for the camera to finish hunting around for focus, and it's certainly no match for the likes of the Olympus PEN E-PL5 or Panasonic G5 with their near instant autofocusing capabilities.

Those put off by electronic viewfinders will enjoy the OVF on the EOS 100D. Although quite small, it still gives a clear and bright view. It's worth bearing in mind that it doesn't give a 100% field of view, unlike the majority of EVFS. Although not articulating, the 100D's 3-inch screen gives a reasonable angle of view if you need to shoot from awkward angles.

It's nice to see Canon considering its audience by including filter effects on the 100D, and a few here are good fun to play with – it's certainly worth experimenting if you like that kind of thing. We particularly like Grainy Black and White and Toy Camera effect.

VERDICT

What Canon has managed to produce in the EOS 100D is pretty special – a very small body that retains the same DSLR stylings, and more importantly, produces a similarly impressive image quality to its siblings. However, the problem remains that although the camera itself is small, the overall system is not. By the time you attach the 18-55mm kit lens, it's not too much smaller than other, cheaper, cameras in Canon's range. Furthermore, if you're intending to use several lenses, you will still need a pretty large kit bag.

It's worth looking into the 40mm pancake lens as an accompaniment, since its incredibly small size makes it a reasonable combo for street shooting – albeit with a longer (equivalent) focal length than we'd usually recommend for such work.

The new 18-55mm STM kit lens is also a very good performer, and if this is your first SLR then it's worth buying the standard kit box, rather than going for the body only.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★★	★★★☆☆

Overall ★★★★☆

WE SAY: The 100D produces excellent images and is a fantastic choice for the first-time DSLR buyer. However, with large lenses and accessories, downsizing the camera doesn't really mean too much.



> THE SPECS	
Sensor	24.2MP APS-C (22.3 x 14.9mm) CMOS sensor
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC
Viewfinder	Optical viewfinder, 95% coverage, 0.82x magnification
Video resolution	Full HD (1,920x1,080 pixels) at 30, 25 or 24fps
ISO range	ISO 100-12,800 (expandable to 25,600)
Autofocus points	19
Max burst rate	5fps
LCD screen size	3-inch; 1,040,000 dots
Shutter speeds	1/4,000-30 sec, Bulb
Weight	565g (inc battery and memory card)
Dimensions	131.9 x 100.9 x 77.8mm
Power supply	LP-E17 Li-ion battery (supplied with camera)

SLR Canon EOS 760D > £649 / $849 > www.canon.co.uk

Your next SLR?

Angela Nicholson puts Canon's more advanced new 24MP APS-C format SLR through our full testing procedure...

With three cameras in its entry-level range Canon already had plenty to interest novices and enthusiast photographers on a budget. Now the company has replaced the 700D with two models, the EOS 760D and 750D, rather than one.

As the 700D continues in the line-up (for now at least), this means that there are five cameras in what Canon calls its beginners' range. The new 760D and 750D, known as the Rebel T6s and T6i in the US, sit at the top of this group above the 700D, 100D and 1200D.

The 760D is designed with more experienced photographers in mind than the 750D, and has a few features from Canon's high-end cameras. In this review we're going to concentrate on the 760D, but you can find out more about the 750D on page 112.

FEATURES

Although they are aimed at slightly different people, the Canon 760D shares many components with the 750D. For a start they both have Canon's new APS-C format CMOS sensor with an effective pixel count of 24.2 million, a Digic 6 processing engine and a phase detection autofocus system, with 19 cross-type points for use when focusing images in the viewfinder. The cameras can select the appropriate AF point to use automatically in 19-point AF mode, or it can be set manually in groups in Zone AF mode (there are five groups of points for selection) or individually in Single-point AF mode.

There's also Canon's new Hybrid CMOS AF III system (with Face Detection, Tracking AF, FlexiZone-Multi and FlexiZone-Single modes), for use when images or video are composed on the screen in Live View mode. This system has a greater number of focusing pixels, set in a more regular array than before. Canon says it's about four times faster than version II (used in the EOS 100D).

Above That hand grip is deep and comfortable.

The EOS 760D is sold as the Rebel T6s in the US.

Despite the increase in pixel count in comparison with the 700D, which has 18 million pixels, the 760D has a native sensitivity range of ISO 100-12,800, with an expansion setting of ISO 25,600 for when it's vital to get an image in low light. For movie shooting, the maximum native setting is ISO 6,400, and there's an expansion value of ISO 12,800.

When shooting through the viewfinder, the metering system uses a 7,560-pixel RGB and Infra Red (IR) metering sensor. These pixels are grouped into 63 segments (9x7) and the usual options of Evaluative, Partial (6.0% of viewfinder), Spot (3.5% of viewfinder) and Centre-weighted average metering are available. In Evaluative mode the metering is linked to the AF points, so the brightness of the subject could have



Stick or twist? Upgrade advice

Although the 760D and 750D replace the 700D (pictured), with the addition of the rear control dial and a top-plate LCD, the 760D is closer in handling to the Canon 70D. This may take some adjusting to, but it makes the camera quicker and easier to use. The addition of an electronic level is also useful for keeping horizons straight. Most importantly, the 760D can resolve a lot more detail than the 700D without detriment to image noise control, making it a great upgrade.

Zooming in on the... Canon EOS 760D

A quick tour of the camera's key features



Mode dial
This button needs to be pressed before the mode dial can be rotated, which seems rather fiddly at first.





LCD light button
This turns on the top-plate LCD light to allow the settings to be seen in low light .



Sensor
This detects when the 760D is held to your eye and turns off the main screen display.



Viewfinder
If the 760D detects flicker from lights, an icon tells you to use Anti-Flicker Shoot.

Q button
Pressing this button gives a quick route to changing some key settings.





Top LCD
The 760D displays when the Wi-Fi system is active in the top-plate LCD.

an impact upon overall exposure.

Unlike the 700D's (iFCL) metering system, the pixels on the sensor each have their own RGB-IR filter and are read independently within the zone, which Canon claims gives more accuracy and better colour detection. In Live View and video mode the same metering options are available, but the camera uses the imaging sensor to supply the information and Evaluative mode uses 315 zones, Partial metering covers 10% of the scene and Spot 2.7%.

Canon has been pretty quick to appreciate the benefits brought by

> "The pixels on the sensor each have their own RGB-IR filter and are read independently"

touchscreen technology. Like the 700D, the 760D has a 3-inch touch-sensitive Clear View II TFT screen with 1,040,000 dots and an aspect ratio of 3:2 to match the uncropped ratio of the imaging sensor precisely.

In another first for Canon SLRs, both cameras feature Wi-Fi and NFC (Near Field Communication) technology to enable them to be connected to other devices for remote control and image sharing. The NFC function provides a quick way of connecting them wirelessly to other NFC-enabled devices such as a smartphone, tablet, another camera or Canon's Connect Station CS100, the company's portable storage unit. Once enabled via the menu, two NFC devices are connected just by touching their NFC logos together. You can also control the cameras remotely via Wi-Fi using Canon's free app on a smartphone.

Meet the rivals...

The models the 760D is taking on



Canon 750D
£526 / $749 without lens
An alternative use of the 760D's processing engine, sensor, metering, white balance and AF systems.
Reviewed: page 54



Nikon D5500
£608 / $745 without lens
The first Nikon SLR to have a touchscreen, this 24MP has no AA sensor filter for better detail resolution.
Reviewed: page 82

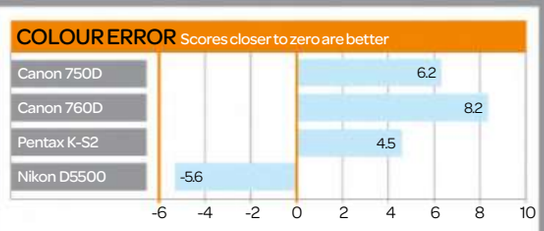


Pentax K-S2
£499 / $597 without lens
This 20MP SLR has a vari-angle screen and Wi-Fi connectivity for sharing images.
Reviewed: page 110

BUILD AND HANDLING

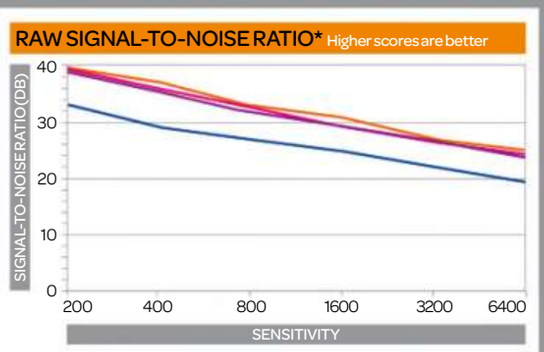
Although they have a different control layout, the 750D and 760D feel very similar in the hand. There's only 0.2mm difference in one dimension between them – the 760D is the slightly taller of the two. They don't have quite the solidity of the 5D Mark III, but they have a chassis that is constructed from aluminium alloy and polycarbonate resin with glass fibre and they feel pretty durable for entry-level models. There's no alarming creaking when you grip them tightly.

CAMERA BENCHMARKS
How does the Canon 760D fare in our tests?

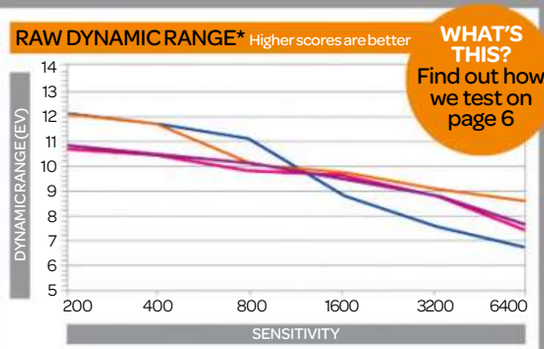


COLOUR ERROR RESULT: This shows that the 760D and 750D produce well saturated images. The Pentax K-S2 is the most accurate.

KEY: Canon 750D, Canon 760D, Pentax K-S2, Nikon D5500



NOISE RESULT: The two Canons beat the D5500 for signal-to-noise ratio – which means that they produce cleaner images.

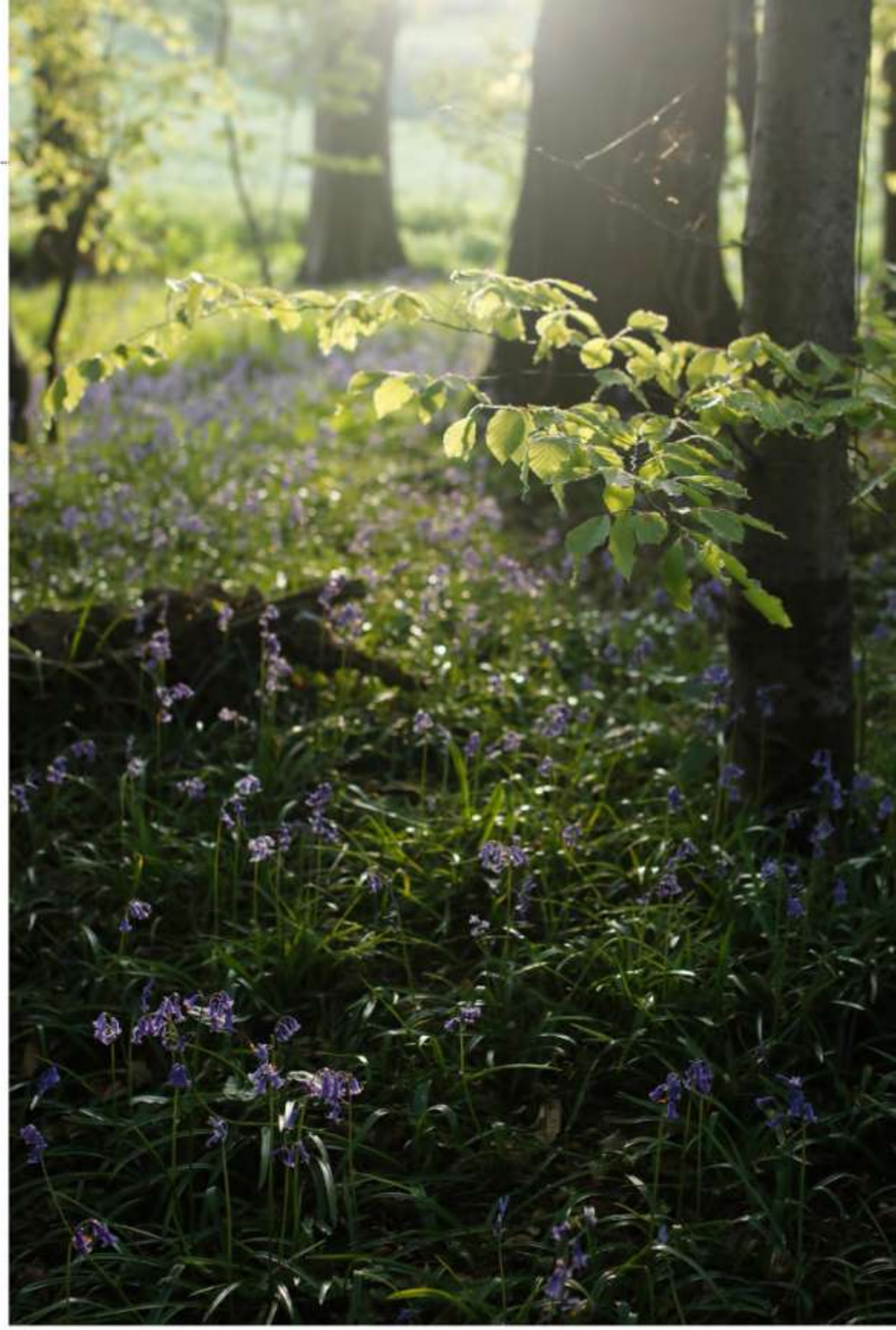


WHAT'S THIS? Find out how we test on page 6

DYNAMIC RESULT: The 760D and 750D capture a wide good dynamic range, but they can't quite match the Pentax K-S2.

OVERALL BENCHMARK RESULT
Both the 760D and the 750D (see page 112) performed well in our tests, indicating that they capture lots of detail and control noise well. They also have consistent dynamic range across their sensitivity range, beating the D5500 at high values. But, in the lab at least, the Pentax K-S2 holds its own in this company.

*** Raw results use images converted to TIFF**



Above The metering and AF systems coped well with this tricky shot.

One of the biggest differences between the two cameras is that the 760D has a secondary (monochrome) LCD on the top-plate. This shows useful information such as the sensitivity, battery level, exposure level, shutter speed and aperture. It's useful to see the camera settings from above and uses less power than the main screen.

In another departure from the 750D, the 760D has a dial around the navigation buttons, with a lock to deactivate it. As on the 70D, this allows quick adjustments to exposure in manual exposure mode and exposure compensation in the automatic and semi-automatic modes, as there's no need to press a button while using the main dial.

The new dial feels lightweight in comparison with the larger dial found on the back of higher-end cameras like the 5D Mark III. It's also rather low down on the body, so it doesn't fall within the natural reach of your thumb: you have to stretch down to it. Nevertheless, it allows quicker adjustments to be made than is possible with the 700D or 750D.

Like the 7D Mark II but unlike the 750D, the 760D has an electronic level that can be shown in the viewfinder or the main screen. This has a dedicated icon in the viewfinder and it doesn't use the AF points, so it can be seen when pressing the shutter release to focus the lens. However, it can be hard to see when the scene is dark and (unlike the 7D Mark II's) it only indicates horizontal tilt, not up/down tilt. The latter means it's useful for getting horizons straight, but it can't help when you're trying to ensure that the sensor is parallel to a building to avoid converging verticals.

PERFORMANCE
Probably the first question that everyone wants to be answered when they hear about the 750D and 760D is whether they produce the same image quality. Not surprisingly, the answer is yes. We saw an occasional exposure variation, but that can easily be explained by slight differences in framing (resulting from the different lens position) and the location of the active AF point. In other respects – colour noise control and detail – our



Check your camera
Sensor marks advisory



Some Rebel T6s and T6i models have been found with marks on the sensor that can't be cleaned off. Canon has issued an advisory notice, which says cameras with serial numbers that start with 01 or 02 may be affected. However, cameras with those numbers that also have a mark on the inside of the battery cover are not affected. Canon will inspect potentially affected cameras and repair them for free.

The advisory note is available via **www.bit.ly/T6s_T6i**. Neither of the samples we used in this test were affected.

"The new metering system in the cameras produces good results even in very tricky conditions"

tests reveal that the two cameras produce the same results.

The follow-up questions are usually "How much detail can they resolve?" and "What's the noise control like?" It's good news on both counts. The level of detail in images is a huge leap up from that from the 700D. Further good news is that the level of noise is about the same, or slightly better than in images from the 700D throughout the sensitivity range. That's despite the six-million hike in pixel count.

At 100% on-screen, high-sensitivity JPEGs from the 760D look softer than simultaneously captured raw files, but even at ISO 12,800 they look good at around A3 size. Raw files have more visible noise at 100%, but it's fine grained and there's no banding, so it's possible to produce images that have a bit more bite than the JPEGs.

While the Live View autofocus system is relatively speedy and can be used when hand-holding the camera to shoot stationary subjects, it's not quick enough to keep up with fast-moving subjects. This means it's best to compose sport and action images in the viewfinder and use the phase detection system, which is fast and accurate. We found this AF system does a pretty good job of selecting the right subject in 19-point mode, but Zone-AF and Single-point mode are a better bet if you can keep the active area over the subject.

Above Both the new Canons could resolve the detail of these tomato stalks.

The new metering system in the cameras is also very good, and it manages to produce good results, even in very tricky conditions when some cameras' metering would falter. Exposure is skewed towards that required by the subject under the active AF point, but it's usually balanced well across the frame. However, that doesn't mean you won't need to use the compensation control occasionally. Very bright sections of sky, for example, can sometimes trick them into underexposing shots.

Below Unlike the 750D, the 760D has a top-plate LCD.



VERDICT

The 760D produces superb-quality images that can match Canon's top-end APS-C format camera, the EOS 7D Mark II, for detail. Noise is controlled well, and colour and exposure are excellent. While the secondary LCD is a useful bonus, it's the 760D's electronic level and the rear dial that really make the difference between it and the 750D in use.

The main and Quick menus are well organised and the touch control is very well implemented, so you switch seamlessly between tapping or swiping the screen and using the control buttons and dials.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★★	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★★	★★★★☆

Overall ★★★★★

WE SAY: The 760D has the same superb image quality as the 750D, but its better handling, secondary LCD and electronic level make it our choice of the two models. It's almost like a smaller, lighter 70D.





There's no secondary LCD on the top-plate of the 750D, unlike the 760D, and the mode dial is on the right instead of the left.



The 750D captures the same impressive level of detail as the 760D.

SLR Canon 750D > £526 / $749 > www.canon.co.uk

Same difference

Angela Nicholson finds the 750D's points of distinction

> THE SPECS

Specifications are the same as for the Canon 760D (page 108), except:

Weight	480g (inc battery and memory card)
Dimensions	131.9 x 100.7 x 77.8mm

The technical specification of the 750D is almost identical to the 760D's, but there are a few little differences that affect the handling.

Starting with the top-plate, there's no secondary LCD and the mode dial is on the opposite side of the camera. The 750D does, however, have a dedicated light to show when the Wi-Fi system is active; the 760D shows an icon on the top-plate LCD instead. This system is activated via the menu on both cameras.



There's no lock but all the mode dial options are the same as the 760D's

The Canon EOS 750D is sold as the Rebel T6i in the US.

There's also a Display button to turn the 750D's rear screen on and off, as it doesn't have the helpful eye-detecting sensor of the 760D.

Because the 750D doesn't have a rear dial, aperture or exposure compensation (depending upon the exposure mode) is adjusted by pressing the dedicated button on the back of the camera while rotating the main dial near the shutter release.

There's no lock, but the 750D's mode dial gives a route to all the same exposure modes including options for enthusiasts and novices.

VERDICT

Our tests reveal that the 750D (as with the 760D) is capable of capturing far more detail than the 700D, and noise is controlled well. The metering and phase detection autofocus and white balance systems also perform identically. This makes the 750D a good choice if you want to save a bit of cash, but I'd go for the 760D if you can stretch to it.

Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★½☆
PERFORMANCE	**VALUE**
★★★★½	★★★★½

Overall ★★★★½

WE SAY: This is a great camera that's capable of producing superb quality images which have much more detail than the 700D's. The control layout, however, is almost identical to its predecessor's.

Zooming in on the... Canon 750D

A few differences from the 760D revealed



No eye sensor
The 750D can't detect when the viewfinder is in use, so you have to turn off the main screen display yourself.

Networking
Like the 760D, the 750D's Wi-Fi and NFC system is activated via the menu.

Touchscreen
This can be used for making setting selections and adjustments and swiping through your images.

Exposure control
This button is used with the dial near the shutter release to change exposure compensation or aperture

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> THE SPECS	
Sensor	APS-C format 20.2MP CMOS
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC and CF
Viewfinder	Pentaprism with 100% coverage
Max video resolution	1,920 x 1,080 pixels
ISO range	100-16,000 (expandable to ISO 51,200)
Autofocus points	65
Screen	3-inch 1,040k-dot LCD
Shutter speeds	30-1/8,000 sec plus Bulb
Weight	820g (body only)
Dimensions	148.8 x 112.4 x 78.2mm
Power supply	Rechargeable Li-ion LP-E6N battery (supplied)

Digital Camera GOLD AWARD

SLR Canon EOS 7D Mark II > Body only: £1,299 / $1,499 > www.canon.co.uk

A good sport

Is the 7D Mark II worth the five-year wait for the upgrade to Canon's most enthusiast-friendly SLR? **Angela Nicholson** finds out

As you might guess from its name, the new Canon EOS 7D Mark II replaces the Canon 7D. It therefore assumes its place above the APS-C format Canon 70D and below the full-frame Canon 5D Mark II in the Canon SLR line-up. Inside is a new 20.2-million-effective-pixel sensor with redesigned micro-lenses that allow more light to pass through onto the photo diodes.

To boost performance and enable a maximum continuous shooting rate of 10 frames per second, Canon has given the new camera two Digic 6 processing engines. When a UDMA 7 CF card (such as the Lexar Professional 1066x card) is installed, up to 31 raw files or 1,030 JPEGs can be shot in a single burst. If you need to shoot for more than 3.1 seconds, the High continuous shooting rate can be set between 2-10fps, while the Low rate can be set to 1-9fps and Silent mode to 1-4fps.

The sensor and processing engine combination also allows a native sensitivity range of ISO 100–16,000, the widest of any Canon camera. If it's not enough, there are expansion settings going up to ISO 51,200.

While the 7D has 19 autofocus points, all of which are cross-type, its replacement has a class-leading 65 points; again, all are cross-type. With f/2.8 lenses, the central point is dual-cross type for extra sensitivity and is capable of operating when lens and teleconverter combinations take the effective aperture down to f/8. It's also possible to adjust tracking sensitivity, acceleration/deceleration tracking and AF point auto switching options. There are also seven AF point selection modes.

In Live View and video mode, the Dual Pixel AF system comes into play. Videographers will love the ability to slow the focusing down to produce a more cinematic transition.



Above This new switch helps speed up setting changes.

Other notable features include dual card slots (one SD/SDHC/SDXC, the other CompactFlash); an intervalometer for shooting time-lapse sequences; HDR mode (with raw file recording); multiple exposure mode; a built-in compass; and GPS to enable image geotagging. Sadly, there's no Wi-Fi connectivity built in. A Canon Europe representative told us the Mark II's metal body may compromise Wi-Fi performance.

BUILD AND HANDLING

Canon has retained the 7D's magnesium alloy construction for the Mark II, but it has uprated its weather-proofing so that it is the second most weather-resistant Canon SLR after the 1Dx. This may in part explain the 90g increase in weight and slightly larger size. In any case, the camera feels nice and solid, and



Stick or twist? Upgrade advice

Canon may only have increased the pixel count of the 7D Mark II by two million in comparison with the original 7D (left), but the new camera resolves noticeably more detail at most sensitivity settings. The autofocus system is also significantly upgraded, with 65 points instead of 19, and has the same pro-level customisation options as the Canon 1Dx and 5D Mark III. The exposure metering system is the best that Canon has to offer. Travel photographers may also appreciate the addition of GPS.

Zooming in on the... Canon 7D Mark II

A smart layout that gives you access to integrated tech





This button needs to be pressed before the dial can be rotated. We'd prefer a design that can be left locked or unlocked as you like.



The GPS unit is located here. Perhaps a Wi-Fi unit could've gone in its place?



The optical viewfinder shows 100% of the scene and can display an electronic level, as well as important information such as exposure mode, white balance mode, drive mode and the metering mode.



This gives access to the Picture Style, multiple exposure and HDR options. In Review mode, it enables you to compare two images side by side and scroll through shots.

Pressing this when reviewing an image rates it out of five, and the rating is stored with the EXIF data.



We shot over 1,000 images and used the GPS system throughout a day's shooting: the battery still had plenty of power left.



the shutter has a claimed durability of 200,000 cycles.

The grip on the front of the camera and the thumb-ridge on the back have an excellent textured coating, so they feel really secure in your hand. We found the thumb-ridge, which is thinner and more angular than the 7D's, particularly good.

Owners of the original 7D will find the Mark II familiar, but there are a few changes to the control layout. There are Rate and Creative Photo buttons, for example, as well as a new sprung selection lever around the mini-joystick control. This can be used to change the function of the main control dial in front of the shutter release on the top of the camera. We found it useful for accessing the sensitivity options.

> "The images and video the 7D Mark II produces look great straight from the camera"

PERFORMANCE

On the whole, the images and video the 7D Mark II produces look great straight from the camera. It's also capable of resolving an impressive level of detail: it matches the 24MP Sony Alpha 77II and beats the 24MP Nikon D7100 in this respect until you choose an upper sensitivity setting.

Noise is also controlled well throughout the native sensitivity range, but as usual the expansion settings (which Canon considers not of sufficient quality for normal use) are best reserved for emergency situations or when images only need to be viewed at small sizes. JPEGs captured at the maximum expansion (ISO 51,200) have luminance noise

Meet the rivals...

The cameras taking on the 7D Mk II



Canon EOS 6D
Price: £1,139 / $1,399 (body)
Full-frame yet more affordable, the 6D is a great camera, if a little less serious than the 7D Mk II.
Reviewed: page 60



Nikon D7100
Price: £748 / $797 (body)
Superb detail and excellent AF performance but a little hampered by a restricted buffer capacity. Great price.
Reviewed: issue 138



Sony Alpha 77 II
Price: £764 / $998 (body)
Sony's best SLT so far has an impressive feature set and a very capable autofocus system.
Reviewed: page 124

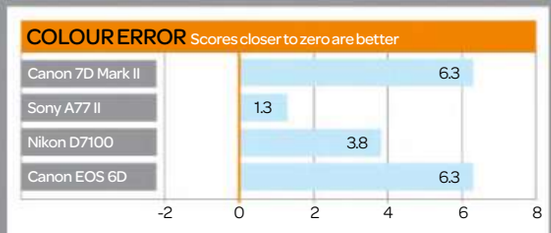
CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

WHAT'S THIS? Find out how we test on page 6

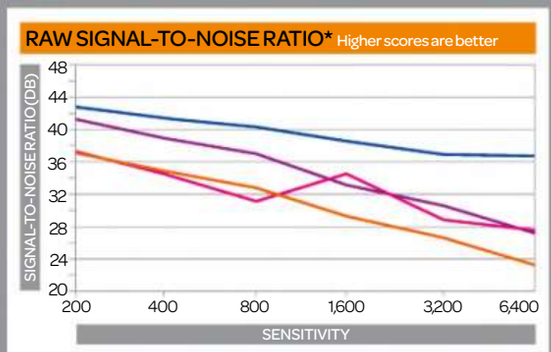
CAMERA BENCHMARKS

How does the 7D Mark II measure up?

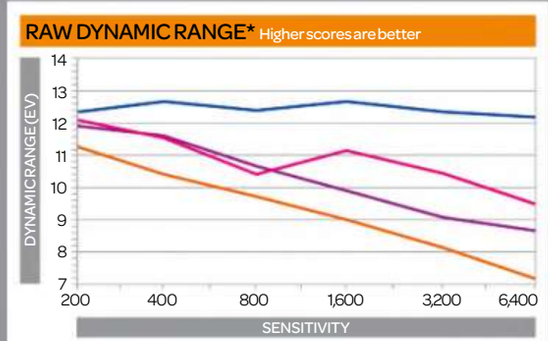


COLOUR ERROR RESULT: Like other Canon cameras, the 7D Mark II isn't the most accurate, but images have very pleasant saturation.

KEY: Canon 7D Mark II, Sony A77 II, Nikon D7100, Canon EOS 6D



NOISE RESULT: The 7D Mark II beats the APS-C cameras at low-to-middle sensitivity settings, so its image noise is not excessive.



DYNAMIC RESULT: The 7D Mark II falls behind the Nikon D7100 from about ISO 800 upwards. The full-frame Canon 6D stands out.

OVERALL BENCHMARK RESULT

The 7D Mark II makes a significant improvement upon the original 7D at the vast majority of its sensitivity settings. It also manages to out-resolve the Canon 6D at in the ISO 100-3200 range, but the larger sensor still brings advantages to noise control and dynamic range.

* Raw results use images converted to TIFF



visible at most normal viewing sizes, and some areas appear bruised with green and magenta. Stepping down to the uppermost native setting (ISO 16,000) results in a significant improvement in image quality. When all noise reduction is turned off, ISO 16,000 raw files have a hint of coloured speckling visible when sized to A3. Zoom in to 100% and this chroma noise becomes very noticeable, but there's still a respectable level of detail, so it's possible to find a good balance between the two in post-processing.

Above This ISO 200 JPEG image has an impressive amount of detail.

At the other end of the sensitivity scale, there's just a hint of luminance noise in some areas at 100% (even at ISO 100), but images have lots of detail visible.

One of things that impressed us most about the 7D Mark II during our testing is its new 252-zone metering system, which gathers data from a 150,000-pixel RGB and infrared sensor. In the past, we have found Canon's iFCL metering system a little frustrating in Evaluative mode: it can put too much weighting on the brightness of the subject under the active AF point, so you can end up with badly over- or under-exposed shots in high-contrast conditions. It acts more like centre-weighted metering than some other systems.

The new system in the Mark II does a better job of taking the brightness of the whole scene into account. Naturally, there is still some weighting applied, but we found there are fewer occasions when exposure compensation is required.

That said, there seems to be a slight tendency towards bright images. Some of our landscapes shot in bright conditions look better when the exposure is reduced by about 1/3EV, either in-camera or post-capture.

As we have found in the past with Canon SLRs, the 7D Mark II's automatic white balance system does a great job of capturing the atmosphere of the scene. In bright sun, it produces pleasingly warm tones; in overcast conditions, it captures the coolness without going overboard and giving a blue tint. Overall, the results look natural. The Standard Picture Style also provides a good general-purpose setting that generates JPEGs with pleasant colours and decent saturation.

We've been looking forward to testing the 7D Mark II's 65-point

> "We've been looking forward to testing the Mark II's autofocusing system, and it didn't disappoint"



autofocusing system, and it didn't disappoint. It's both fast and accurate, and capable of working in very low light. It's also complex and takes some getting to know. Provided that you select the correct AF point selection mode and AF AI servo characteristics (which can be set via a selection of shooting scenario Case Studies), it does a great job. We found Case 1 in the selection list a good starting point that worked well when shooting BMX riders in action.

Above The auto white balance system captures the warm light well in this shot.



Left The 18-135mm kit lens isn't the sharpest optic, but it's a good start.

In addition, the hybrid AF system, which is available when composing video or still images on the LCD screen in Live View mode is capable and able to find its target, even when you're shooting in quite low light. With an STM lens mounted, there's little back-and-forwards adjustment, even in fairly dull conditions. Although it's quite a large camera to use held away from your body, it's possible to use Live View when hand-holding the camera.

Switching from Standard to the slowest AF setting in the Movie Servo AF speed options has a significant impact upon the time the camera takes to focus the lens. Either way, it moves the subject smoothly into focus. If you need to speed things up when using the slowest setting, however, pressing the AF-on button gets the subject sharp quickly.

VERDICT

Enthusiast photographers shoot a bit of everything, so they need a versatile camera. The EOS 7D Mark II's weatherproofing means that it can be used in harsh conditions, and its autofocus system gets moving subjects sharp quickly. The metering system delivers correctly exposed images in a wide range of conditions. Noise is also controlled well, colours are pleasantly rendered and images have an impressive amount of detail.

It's not often we recommend upgrading a model to its immediate successor, but the Mark II is an exception. It's a great update.

Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★☆

Overall ★★★★★

WE SAY: Canon's best APS-C format SLR to date, the 7D Mark II has bags of appeal to the enthusiast wedded to the idea of an SLR rather than a compact system camera. It's even worth it if you already own a 7D.



> THE SPECS	
Sensor	20.2Mp full-frame (36x24mm) CMOS
Focal length conversion	1x
Memory	SD/SDHC/SDXC
Viewfinder	Optical (with 97% coverage)
Video resolution	1920x1080p
ISO range	100-25600 (expandable to 50-102400)
Autofocus points	11 (1 cross-type)
Max burst rate	4.5fps
LCD	Three-inch, 1,040,000-dot Clear View TFT
Weight	755g
Dimensions	144.5x110.5x71.2mm
Power supply	Rechargeable Li-ion LP-E6 battery (supplied)

Digital Camera EDITOR'S CHOICE

SLR Canon EOS 6D > £1,139 (body only) > www.canon.co.uk

Little and large

The EOS 6D is Canon's most affordable full-frame SLR yet. **Ali Jennings** finds out whether it has enough features to keep enthusiast photographers happy

The Canon EOS 6D is in many ways Canon's first true enthusiast-level full-frame digital camera. This is because its design and handling are far closer to that of the APS-C format 60D below it than the 5D Mark III and 7D above it in Canon's current SLR line-up.

While it may not have quite such an impressive specification as the 5D Mark III and 7D, Canon has given the 6D Wi-Fi and GPS technology – a first for an SLR camera. These features are very handy for recording your location and taking wireless control of your camera, or uploading your images directly to your computer or your Facebook account without having to carry cables in your bag.

But is the 6D a savvy buy for budget-conscious enthusiast photographers who want to step up to full-frame shooting, or does its pared-down specification leave them feeling a bit short changed?

FEATURES

Inside the 6D is a 20.2-million pixel full-frame CMOS sensor, which combined with the DIGIC 5 processor, allows a native sensitivity range of ISO100-25600. This range is fine for landscape photographers and low-light work, but it can be extended to ISO50-102400 if necessary.

Confusingly, the 6D has a total of 11 autofocus points, two more than the 60D below it, but whereas the 60D has nine cross-type points, the 6D has just one – the centre point. This doesn't mean that the AF system is completely dumbed-down though, as there are some advanced controls that have migrated from the 5D Mark III. These controls enable you to adjust the tracking sensitivity and the tracking of accelerating or decelerating subjects, which is really useful when shooting moving targets.

At 4.5 frames per second (fps), the 6D's maximum continuous shooting rate is also slower than the 5.3fps of the 60D. Even given the 60D's 2Mp lower resolution this seems odd, because it also has the older DIGIC 4 processor.

Another key difference between the 6D and the 60D, of course, is that the APS-C format model has an articulating LCD screen. In other respects, however, the screens are the same, and both cameras have a three-inch, 1,040,000-dot device.

It's also worth pointing out that Canon has a free app that enables smart phones and tablets to be used as a remote viewfinder and controller via Wi-Fi, so many users won't be concerned about the fixed LCD.

Above The Canon EOS 6D houses a 20.2Mp full-frame CMOS sensor

Full HD video capture is possible, but as with both the 7D and 60D, there's no headphone socket for you to monitor the sound while you're recording. However, hitting the camera's Info button when shooting in Movie Live View mode switches between the different overlay and info screens. One of these includes a visual audio level that enables visual monitoring of the sound levels when recording, as well as allowing you to make manual adjustments.

BUILD AND HANDLING

Although the 6D's weight is the same as the 60D's, it has half a centimetre more on its height and slightly less depth, which means that the grip is



You can control the 6D via a smart phone with the EOS Remote app

FEELING TREATED



The GPS system means you can geotag images as they are taken



There's no PC sync socket for connecting lights or a pop-up flash



The viewfinder covers 97% of the frame, not 100% like the Nikon D600

FEELING CHEATED

Zooming in on the... Canon EOS 6D

A quick tour of the camera's key features



The mode dial has a lock to prevent it moving out of position between shots. There are shooting options for less experienced photographers, as well as enthusiasts



Pressing the Info button in Live View mode allows the audio levels to be assessed visually and adjusted



The ISO button can be identified with your finger when the camera is held up to your eye



As on the 7D, this switch goes one way for stills Live View mode and the other for video Live View mode



deeper. This makes a surprising amount of difference to handling, and gives the grip better purchase.

A thoughtful button layout gives quick access to many of the camera's main features, and settings changes can be made quickly, although a Spartan viewfinder display means its often necessary to take the camera away from the eye while doing so.

The navigation control on the back of the camera features the same functionality as the 60D's, with a rotating outer ring to adjust settings such as aperture or shutter speed, a central directional pad for navigating menus and an inner Set button for confirming settings changes. Its position is ideal when you're reviewing images and making settings changes, and when you're shooting with the camera to your eye, as it's within easy reach of your thumb.

> "The 15 different screens seem a bit much, but this is due to Canon deciding against scrolling screens"

We also like that images can be magnified by pressing the button to the left of the Quick Menu button, and then rotating the front control dial, instead of using the two zoom buttons that featured on the top right on the 60D and 7D.

Canon's menus have been expanding, and the 6D features a huge assortment of options. Initially, the 15 different screens seem a bit much, but this is due to Canon deciding against scrolling screens and giving a full list of options under each menu tab. This makes locating the feature you want far easier.

As with other Canon EOS models the final menu tab is a My Menu screen. This is where you can place all of your most commonly-used features – we used it to access the camera's custom white balance, image quality, Mirror Lock-up and ratings controls.

PERFORMANCE

With 11 AF points grouped around the centre of the frame there is a fair amount of choice, but only the centre one is cross type. This means that although the camera can focus quickly when the peripheral points are used, it doesn't track moving subjects quite so well as when the centre point is

Meet the rivals...

See how the 6D stands up against the competition



Nikon D600
£1,449 (body only)
This full-frame SLR has a higher resolution, more AF points and a built-in flash, but no integral Wi-Fi.
Reviewed: issue 131
★★★★★



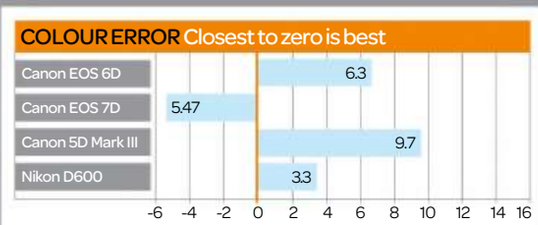
Canon EOS 7D
£995 (body only)
Although it has an APS-C format sensor, the 7D has more advanced features and handling than the 6D.
Reviewed: issue 93
★★★★★



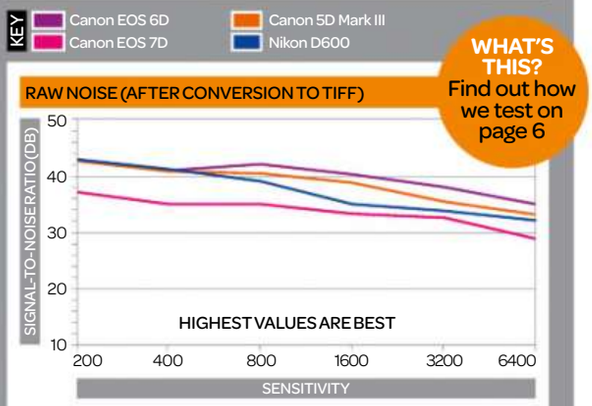
Canon EOS 5D Mark III
£2,250 (body only)
An all-rounder and better built than the 6D, but with no built-in Wi-Fi and a much higher cost.
Reviewed: page 28
★★★★★

SLR BENCHMARKS

See how Canon's 6D fared in our tests

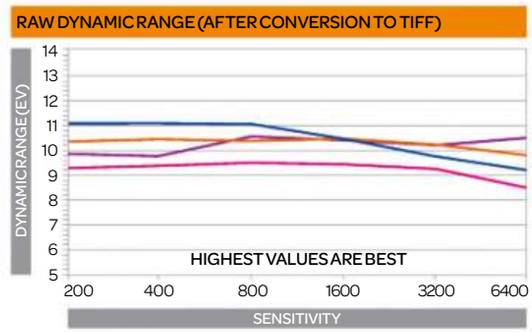


COLOUR ERROR RESULT: Although the colour score isn't as near to technical perfection as the D600's, the results look pleasing



WHAT'S THIS? Find out how we test on page 6

NOISE RESULT: Here, the 6D is on a par with the 5D Mark III and better than the D600 at higher sensitivities



DYNAMIC RESULT: Although not a match for the D600 below ISO800, above this the 6D leads the way by some measure

OVERALL BENCHMARK RESULT

The EOS 6D produces well-saturated JPEGs with warm tones direct from camera. Signal-to-noise ratio results show noise is handled well throughout the sensitivity range. At the lower range noise is hard to spot, but at ISO25600 coloured speckling can be seen. At first the dynamic range results for the JPEG files seem disappointing, but the images have good tone and contrast. Raw images have a high tonal range too.



Above The white balance and metering systems coped well with this sunrise scene

activated. When photographing deer we had a near 100% success rate when using the centre point, but many of the images benefitted from cropping to improve composition.

As with both the 60D and 7D, the 6D uses the iFCL metering system with a 63-zone dual-layer metering sensor. As we've seen on previous EOS bodies, this system is extremely accurate, taking into account the focus point, colour within the scene and the amount of available light. In practice this works well, but in high-contrast situations a little positive or negative Exposure Compensation is sometimes required, depending on the brightness of the subject under the active autofocus point.

Shooting wildlife against a flat sky in relative low light really put the metering to the test, and while a small amount of positive Exposure Compensation was dialled in to lift the darker details, the camera's iFCL metering again proved that it was able to read the scene and subject well to capture the shot we wanted.

The 6D's colour rendition is excellent, adding slight but not overwhelming warmth to images, so JPEGs are pleasing to the eye direct from the camera. Helpfully, the LCD screen's representation of the final image is spot-on, enabling you to accurately gauge whether or not you have captured the image you want.

During part of this test we shot landscapes from dawn 'til dusk, through the different levels of light, and the metering and auto white balance systems performed well. There were no situations in which more than a small adjustment to the Exposure Compensation was needed. White balance throughout was accurate, and even in the low light of the setting sun the camera reproduced the colours with a good amount of vibrance and clarity.

There are no visible signs of noise at the lower end of the sensitivity range. By ISO800 there is a small amount of luminance noise, but it is only at ISO25600 that chrominance



Tech Briefing
Wi-Fi



Wi-Fi technology is slowly appearing in compact cameras, but the 6D is the first SLR to feature it built in. Canon's engineers have produced a solution that's easy to set up and is beautifully executed. As well as allowing a smart phone to control the camera, it's possible to use the Wi-Fi to upload to the phone and then Facebook and Twitter, transfer files between camera bodies or computers, or to your printer or a WiFi enabled TV.

Pairing a camera and an iPhone takes a couple of minutes, then you can adjust the settings via your iPhone's screen. The app enables you to select a focus point, zoom in on the image preview and adjust the exposure before firing the shutter.

noise can be seen, and then only slightly. However, the detail smoothing to combat noise in JPEG files is apparent, and while noise is subdued, some of the detail is also lost, although images are still usable.

There is quite a difference between the appearance of JPEG and raw files, and Canon has done an excellent job with the JPEG processing – these images are instantly pleasing direct from camera. Our lab tests reveal the 6D's JPEGs have a relatively average dynamic range, but the images have good contrast and punchy colours. The raw files, by comparison, contain a good two stops of extra shadow and highlight detail that can be recovered in post-processing.

Above The Canon EOS 6D copes well under tricky lighting conditions, needing little compensation to expose the shot

Below The layout of the buttons and dials has been well thought out



OUR VERDICT

There's no doubt who the 20.2Mp 6D is aimed at. With some pro features stripped, you're left with a camera finely tuned to the needs of the enthusiast. The full-frame sensor captures images that are rich in colour and tone, with JPEGs direct from camera needing only a slight tweak, if that. Raw files contain plenty of detail, and their dynamic range enables you to pull back highlights and shadows with minimal introduction of noise.

Although focus speeds are slower than those of the 7D, they're not sluggish, with the centre point AF locking on target and finding focus with good accuracy even in low light conditions (especially when a top-notch L-series lens is used). Outside of the centre point autofocus is by no means slow, and although grouped quite tightly around the centre of the frame, there's still decent flexibility.

It would be nice to be able to customise the weighting that the iFCL metering system gives to the brightness of the subject under the active AF point, as in high-contrast lighting conditions this can have a significant impact upon the image. In some instances it appears to work more like Centre-weighted metering than Evaluative.

All things considered, the 6D is an excellent choice for the enthusiast and club photographer looking for a full-frame SLR. These users will find they have just about everything that they need, and a bit more besides. It may take a while to get to grips with the subtleties of the camera's AF system, and you'll have to remember some of the basics of metering when using the iFCL evaluative system in high-contrast conditions, but you will appreciate the end results.

Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★★★☆

Overall ★★★★☆

WE SAY: The Canon EOS 6D is an excellent choice for enthusiast photographers looking for a full-frame SLR. It gives you just about everything you need and produces great images straight from the camera.



> THE SPECS	
Sensor	50.6 million effective pixel full-frame (36 x 24mm) CMOS
Focal length conversion	1.0x
Memory	CompactFlash and SD/SDHC/SDXC
Viewfinder	Optical with pentaprism covering 100%
Video	Full-HD (1,920 x 1,080) at 30 / 25 / 24fps
ISO range	100-6,400 expandable to 10-12,800
Autofocus points	61, all cross-type; phase detection in reflex mode
Max burst rate	5fps
Screen	3-inch 1,040k-dot LCD
Shutter speeds	1/8,000-30 sec plus Bulb
Weight	845g without lens
Dimensions	152 x 116 x 76mm
Power supply	Rechargeable LP-E6N lithium-ion battery

Digital Camera GOLD AWARD

SLR Canon 5DS, £2,999 / $3,699; 5DS R, £3,199 / $3,899 > www.canon.com

High rollers

Angela Nicholson tests the Canon 5DS and 5DS R to see if they live up to their promise of setting new standards...

Canon's 5D line of SLRs was the first to bridge the gap between professional and amateur photography, giving enthusiasts an affordable route to full-frame shooting and pros a smaller, lighter back-up camera.

Now we have the 5DS and the 5DS R, both of which have 50.6 million effective pixels on their full-frame sensor – that's a count that matches that of medium-format models like the Pentax 645Z.

Neither model is set to replace the 5D Mark III: they give a higher-resolution alternative. The 5DS and 5DS R are identical apart from a small but significant difference with the sensor (see 'What's the difference?' below), so unless otherwise stated, we'll use 5DS in this review to mean both it and the 5DS R.

FEATURES

The 5DS has two Digic 6 processing engines instead of the single Digic 5+ processor of the 5D Mark III. This enables a native sensitivity range of ISO 100-6,400, with expansion settings taking this to ISO 50-12,800. For comparison, the native range of the 5D Mark III is ISO 100-12,800, and the expansion settings take the range to ISO 50-102,400.

Despite all the processing power, the 5DS can 'only' manage a maximum continuous shooting speed of 5fps (for 510 Large Fine JPEGs or 14 raw files with a UDMA CompactFlash card installed), rather than 6fps for 16,270 Large Fine JPEGs or 18 raw files of the 5D Mark III with the same card.



Above The 'R' in the logo is the only visible difference between the 5DS and the 5DS R.

Other significant changes from the 5D Mark III include a 150,000-pixel RGB+IR metering sensor with 252 zones, and Intelligent Scene Analysis in place of the iFCL device with 63 zones; a new M-Raw images size that records 28MP images; and a USB 3.0 port. There's also an Intelligent Viewfinder II with AF point illumination in AI Servo mode.

Other introductions include a new Fine Detail Picture Style to tailor the look of JPEGs, and a collection of mirror lock-up options, a built-in intervalometer and the ability to shoot timelapse movies.

BUILD AND HANDLING

Outwardly the 5DS looks the same as the 5D Mark III. However, there have been some changes to the build of the camera to reduce vibrations, which

WHAT'S THE DIFFERENCE?

A technical tweak enables the 5DS R to resolve more detail than the 5DS

Both the cameras have a low-pass filter over the sensor. However, the 5DS R has a secondary 'cancellation' filter that enables it to resolve a little more detail, but runs the risk of images suffering from moiré interference. Some other manufacturers have removed the low-pass filter to achieve the same thing. Canon claims that removing the filter would alter the camera's focal plane and require an internal redesign. As yet Canon hasn't been able (or willing) to explain why removing the filter would cause this, but adding a second filter does not.



Zooming in on the... Canon 5DS

Lots of control options on offer here





Mode dial
When the Scene Intelligent Auto mode is selected, the camera analyses the scene and selects appropriate settings automatically.



Menu button
You can create up to five My Menu tabs with customisable names in the menu – and each one can have up to six features assigned to it.

Rate button
This is useful to give images a star rating and find them quickly after downloading. It can also be customised.





Video button
Although it can record video, the 5DS has no headphone socket for audio monitoring.

Viewfinder
The viewfinder can show the cropping when shooting 1:1 (square) format, as well as the 1.3x and 1.6x crop images. 16:9 or 4:3 images can only be shot in Live View mode.

Creative Photo button
HDR mode is accessed here. It records raw and JPEG files, so can be used like an advanced bracketing option.



could have significant implications for such a high-resolution model. The mirror movement, for example, is controlled by a mechanism to avoid the slap that is typical of SLRs and can lead to blur-inducing mirror-shake. It makes a noticeable difference to the sound and feel of the camera in use.

Externally, the 5DS has exactly the same shape and control layout as the 5D Mark III. This means you can slip seamlessly between the two, perhaps using the 5D Mark III to shoot sport or video, and the 5DS for detail-rich subjects like landscape and macro.

The 5DS has the same AF system as the 5D Mark III, which means there are quite complex options to control how the camera responds to moving subjects in continuous AF mode, plus six AF point selection modes. By default, an autofocus point (or zone) is set with the AF Point Selection button near the thumb rest on the back of the camera, then using the mini-joystick-like Multi-controller.

> "You can customise the screen to remove options you don't use and change the size of icons you do"

Being a full-frame SLR, the 5DS has a large optical viewfinder. This is bright and shows 100% of the scene, so there are no nasty surprises around the edges of images. Like the 5D Mark III, it's possible to display an electronic level in the viewfinder as well as on the main screen; but unlike the 5D Mark III, the 5DS uses a dedicated icon instead of the AF points. This means the level stays visible even when the shutter release is depressed to focus the lens.

When using manual focus in Live View mode, the on-screen image can be magnified by 6x or 16x. This makes details clear, but you become acutely aware of how much wobble is introduced by touching the camera. It's a good reminder to engage Mirror Lock-up mode. The ability to set the shutter to fire following a set delay after the shutter release is pressed means that a remote release is unnecessary in many situations.

The options in the 5DS's Quick menu are logical, but it's possible to customise the screen to remove any options you don't use and change the size of icons representing those that you do. It's a nice touch.

Although the 5DS isn't a natural choice for videographers, it's worth

Meet the rivals...

Here are the models the Canon 5DS is up against...



Canon 5D Mark III
£2,250 / $2,499, body only
The same weatherproof build and control layout as the 5DS, but with just 22.3MP on the sensor.
Reviewed: page 28
★★★★★



Nikon D810
£2,349 / $2,997, body only
A superb 36MP full-frame SLR that ruled the roost for resolution until the 5DS came along.
Reviewed: page 28
★★★★★

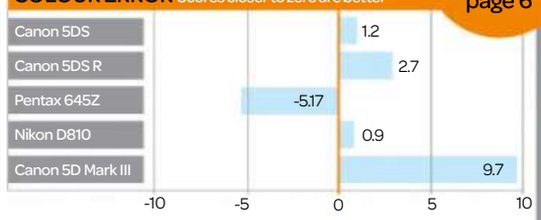


Pentax 645Z
£6,799 / $8,095, body only
Affordable in medium-format terms, this 50MP model is at home on location or in the studio.
Reviewed: page 28
★★★★★

CAMERA BENCHMARKS
How does the Canon 5DS compare?

WHAT'S THIS? Find out how we test on page 6

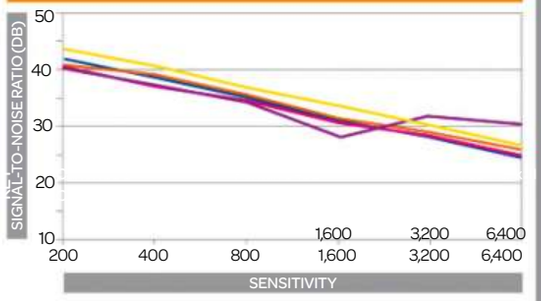
COLOUR ERROR Scores closer to zero are better



COLOUR ERROR RESULT: With good colour accuracy, the 5DS produces natural-looking JPEG files with appealing saturation.

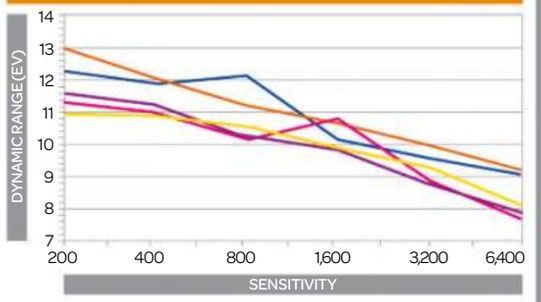
KEY: Canon 5DS, Canon 5DS R, Pentax 645Z, Nikon D810, Canon 5D Mark III

RAW SIGNAL-TO-NOISE RATIO* Higher scores are better



NOISE RESULT: These results indicate that the 5DS produces noisier images. This isn't surprising given the likely pixel density of its sensor.

RAW DYNAMIC RANGE* Higher scores are better



DYNAMIC RESULT: While the 5DS's dynamic range is good at the lower sensitivity values, it doesn't quite match the competition.

OVERALL BENCHMARK RESULT

The higher pixel density of the 5DS's sensor means it struggles to match the signal-to-noise ratio and dynamic range of the others, indicating that images will be noisier and have fewer tones. Our real-world images show the 5DS controls noise well, and detail levels are high, even at ISO 12,800.

* Raw results use images converted to TIFF

noting that like the 5D Mark III, the large Quick Control dial on the back of the camera can be used as a touch-control, so near-silent adjustments can be made to aspects such as exposure and audio recording level.

PERFORMANCE

The great news is that the 5DS can resolve a fantastic amount of detail. If you want the ultimate in detail resolution, the 5DS R resolves a tiny little bit more than the 5DS, but you have to look at 100 or 200% to spot the difference – and even then it's only in the very finest detail areas. Both cameras out-resolve our resolution chart for most of their sensitivity range, and noise levels are the same from each camera.

Both cameras manage to maintain the high level of detail throughout their sensitivity range; even the ISO 12,800 expansion setting produces images with a high level of detail. At lower sensitivity settings, very fine details and subtle tonal gradations are visible at 100% in JPEG files. Much of this is also visible in images taken at ISO 6,400, but there's a fine texture of luminance noise. Chroma noise is visible at 100% in simultaneously captured raw files when all noise reduction is turned off.

There's a suggestion of luminance noise in darker even-toned areas of JPEG and raw files captured at ISO 400, but you really have to look for it at 100% on-screen. This noise becomes a little more noticeable in ISO 800 images, with chroma noise becoming just visible in raw files when all noise reduction is turned off. Our tests indicate that Canon could have given the 5DS higher sensitivity settings and image quality would have been acceptable, but it seems the company has decided to make it deliver the best stills images possible.

Like Canon's earlier iFCL metering system, the 252-zone RGB+IR metering system with Intelligent Scene Analysis of the 5DS applies a weighting to the exposure required by the subject under the active AF point, but it does a better job of



Above They're not really designed for sport photography, but the 5DS and 5DS R have an excellent AF system that can track moving subjects



Above Thanks to the level of detail they capture, the 5DS and 5DS R are ideal for shooting landscapes.

assessing the rest of the scene and recommending exposure values that work for the scene as a whole.

As the 5DS has the same autofocus system as the 5D Mark III, it was no surprise to find that it's highly capable and can lock on to fast-moving subjects, even in low light. When shooting a cycling event continuously at the 5fps maximum, I noticed the camera started to warm up around the card port. This seems to affect burst depth, and the number of images you can shoot drops dramatically.

At the other end of the shooting rate scale, there's a benefit to using mirror lock-up when the camera is on a tripod, even with shutter speeds of around 1/60 sec and a focal length of 100mm. I set the camera to take the shot one second after the shutter release was pressed: this produced sharper images than those taken without mirror lock-up.



Below The control layout and shape is just the same as the 5D Mark III.

When hand-holding the camera with the Canon EF 24-70mm f2.8L II USM lens mounted, I recommend keeping shutter speed at 1/125 sec or higher to be sure of getting pin-sharp results. It is possible to get sharp results at slower shutter speeds, but 1/125 sec or faster delivers the goods more consistently.

If you're shooting a moving subject, you may find you need to use a faster shutter speed than you're used to, because although the images look sharp as thumbnails or even at normal viewing sizes, they aren't completely sharp at 100%. The small pixels mean that even tiny movements can cause some blur. You may scoff at this pixel-peeping, but why would you buy a 50MP camera if you can only use the images at a size achievable by a 20MP model?

Canon cameras generally produce images with pleasing colours and the 5DS is no exception. However, probably as a result of the extra pixels delivering the huge level of detail and smooth tonal gradations, some of the files have a bit more pep about them. Using the new Fine Detail Picture Style boosts micro contrast a little, bringing out small details and giving edges a naturally sharp look.

VERDICT

While it has an autofocus system that can keep up with fast-moving subjects and can record high quality video, the 5DS/5DS R is designed to take high-quality stills images. The images from the 5DS have an incredible amount of detail, with great colour and exposure in most situations.

Whichever model you opt for, you need to focus carefully, follow the guidelines to avoid camera shake and ensure your lenses can match the resolving power. There's a list of recommended lenses on Canon's website at **www.bit.ly/dc167canon**.

Digital Camera

FEATURES	BUILD QUALITY
★★★★½	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★½

Overall ★★★★★

WE SAY: The Canon 5DS and 5DS R are superb cameras that capture a huge amount of detail. Before you commit to the investment, however, make sure your lenses can match the resolving power.



> THE SPECS	
Sensor	16.3MP APS-C format CMOS
Focal length conversion	1.5x
Memory	SD / SDHC / SDXC
Viewfinder	N/A
Video	1,920 x 1,080 at 30p up to 14min
ISO range	ISO 200–6,400, expandable to ISO 100–25,600 for JPEGs
Autofocus points	49
Max burst rate	5.6fps
Screen	Tilting three-inch, 920,000-dot TFT LCD
Shutter speeds	1/4,000–30 sec plus Bulb to 60 min
Weight	300g (body only)
Dimensions	117 x 67 x 40mm
Power supply	NP-W126 rechargeable lithium ion battery (supplied)

CSC Fujifilm X-A2 > With 16–50mm lens: £349 / $550 > www.fujifilm.com

Flipping good

Fujifilm's most affordable CSC gets an upgrade with the selfie generation in mind. **Angela Nicholson** tries it out

The X-A2 replaces the X-A1 as Fujifilm's most affordable compact system camera. It differs from other X-series CSCs in that it has a standard (and therefore lower-priced) APS-C format CMOS sensor (with a Bayer pattern filter array and anti-aliasing filter), rather than an X-Trans CMOS sensor.

FEATURES

Many of the features of the X-A2 are the same as the X-A1's. For example, Fujifilm has plumped for the same 16.3MP APS-C format (23.6mm x 15.6mm) sensor and the EXR Processor II image processing engine. Also as before, there's no viewfinder built-in, so images must be composed on the screen on the back of the camera. This is still a 3-inch 921k-dot device, but the range of its upward tilting movement has been increased to 175 degrees to make it easier to compose selfies. What's more, when the screen is tilted right up for viewing from in-front of the camera, the X-A2 switches to using Face Detection and the new Eye Detection AF mode.

Other new additions to the focusing system include Auto Macro AF and Multi-Target modes, aiming to make it easier for inexperienced photographers to get subjects sharp.



Above There's a pop-up flash and a hotshoe.

BUILD AND HANDLING

The X-A2 has a solid-feeling metal body, unlike many entry-level cameras, plus the understated design of other X-series cameras. All controls are within easy reach with the fingers or thumb of the right hand. The X-A2's menu is also sensibly arranged, although there's no customisable screen to get quick access to the features you use most often.

The 3-inch 921,000-dot screen is capable of showing lots of detail, but its Sunlight Mode needs to be activated in bright conditions. It's essential to keep an eye on the histogram in this mode, as images look very bright and it's tempting to reduce the exposure.

Although it's easy to link the X-A2 to a smartphone via its Wi-Fi

Meet the rivals...

The cameras taking on the Fujifilm X-A2



Nikon D3300
With 18–15mm lens: £349 / $497
A compact but powerful 24MP APS-C format SLR that's perfect for novices wanting to learn about photography.
Reviewed: page 78



Panasonic GM1
With 12–32mm lens: £429 / $698
An incredibly small 16MP Micro Four Thirds CSC. There's no viewfinder or hotshoe, but you get touch-screen control.
Reviewed: issue 149



Sony Alpha 5100
With 16–50mm lens: £449 / $598
An impressive 24MP APS-C format CSC with a tilting touchscreen, although there's no viewfinder or hot-shoe.
Reviewed: page 118



Reducing the exposure to 1EV below what the multi-zone metering system suggested produced a nicely saturated image here.

connectivity to transfer images, I had no success when attempting to connect it to a computer to transfer images wirelessly via the PC AutoSave software.

PERFORMANCE

It's not possible to shoot raw files at ISO 100 with the X-A2, but the JPEGs look very good and have a decent level of detail. Stepping up to ISO 200 brings a slight boost in the level of detail, as well as the ability to record raw files. The raw files have a bit more detail than simultaneously captured JPEGs, but there's also a slight texture of luminance noise visible at 100%. Chroma noise (colored speckling) makes an appearance in some areas of ISO 400 raw files viewed at 100% when all noise reduction is turned off, but JPEGs captured simultaneously in the default settings look clean.

By ISO 3,200, speckling is visible in some areas of raw files sized to A4 (when all noise reduction is turned off). Meanwhile, the JPEGs look clean at A3, but at 100% some areas look rather painterly. The JPEG version of images captured at ISO 6,400 look good at A3, although some areas lack a bit of detail. Careful processing of the raw files enables images with a bit more detail and acceptable noise levels to be produced.

The X-A2's JPEGs don't have especially impressive dynamic range, but this is something that we have noticed with other Fujifilm cameras, and it's a consequence of the fairly high mid-tone contrast that they have. The raw files look quite flat by comparison, but they have much higher dynamic range.

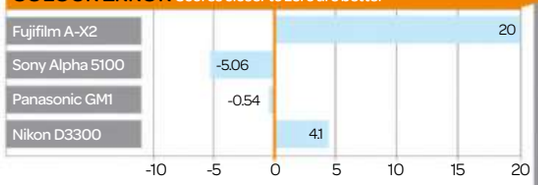
"The X-A2 has a solid-feeling metal body, plus the understated design of other X-series cameras"

SLR BENCHMARKS

How does the X-A2 measure up?

WHAT'S THIS? Find out how we test on page 6

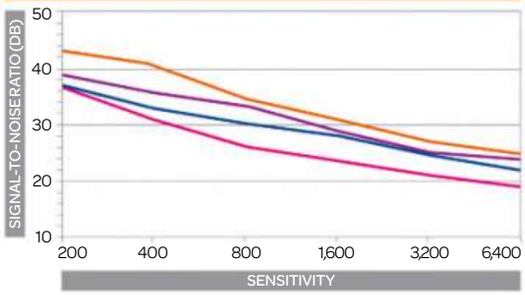
COLOUR ERROR Scores closer to zero are better



COLOUR ERROR RESULT: This indicates that the X-A2's images are highly saturated in the default (Provia) Film Simulation mode.

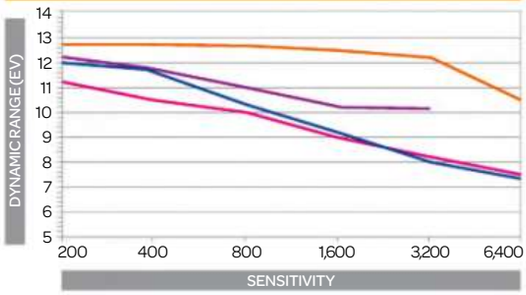
KEY: Fujifilm A-X2, Sony Alpha 5100, Panasonic GM1, Nikon D3300

RAW SIGNAL-TO-NOISE RATIO* Higher scores are better



NOISE RESULT: A solid showing from the X-A2, which confirm our real-world findings that its raw files don't suffer much from noise.

RAW DYNAMIC RANGE* Higher scores are better



DYNAMIC RESULT: The X-A2's raw files have a much wider dynamic range than its JPEGs, indicating they contain many more tones.

OVERALL BENCHMARK RESULT

While the 16MP X-A2 can't compete with the 24MP Sony A5100 and Nikon D3300 for resolution, it captures a good level of detail, the impression of which is boosted by the mid-tone contrast of JPEGs. Noise is generally controlled well, but we'd avoid the top (JPEG-only) sensitivity values because of the loss of detail.

*** Raw results use images converted to TIFF**



Right The screen flips up to help you take selfies.

Zooming in on the... Fujifilm X-A2

There's no viewfinder, but plenty of smart features



Mode dial
This metal mode dial has the usual PSAM options, as well as a Custom mode, a clutch of automatic modes and a route to the Advanced Filters.





Exposure compensation dial
This is a little easier to knock out of position than the mode dial, so it's a good idea to check it hasn't changed between shots.



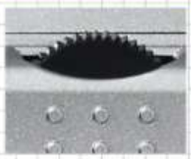
Self-timer button
This is the Macro button on the X-A1. The X-A2 auto-switches to Macro mode so it's now the self-timer control.

Back buttons
These buttons lack tactile definition, but it's rare that you'll hold the X-A2 so close that you can't see them.



Q button
Press this to access up to 16 features for adjustment.





Sub-command dial
This plastic control can be depressed in review mode to zoom into the AF point – a handy way to check focus.

The X-A2's automatic white balance system does a good job, on the whole. It generally captures the feel of a scene without a strong colour cast. However, a few of my shots taken in a mixture of bright sun and shadow look a bit cooler than I would like.

While the X-A2's multi-zone metering system is capable of delivering perfect exposures in quite tricky conditions, there were also a few situations in which I had to dial in a little more exposure compensation than I might have expected.

Although the X-A2's autofocus system isn't great with moving subjects, it gets most still subjects sharp quickly. It even copes quite well with quite low light levels, only becoming indecisive in very low light. The Face Detection system also usually spots any faces in the scene, and the Eye Detection AF latches onto an eye pretty well, provided you're not wearing spectacles. However, it sometimes focuses on a face towards the back of a group, which can mean that those further forward are soft. Similarly, in Multi-Target mode the camera does a reasonable job of identifying suitable areas for focus, but they are not always all in the same plane. You don't know the point of focus until you review the image.

> "Fujifilm's selfie-friendly AF options are useful for those who like taking pictures of themselves"

VERDICT

It may be Fujifilm's entry-level CSC, but the X-A2 has a high-quality feel. It's also compatible with Fujifilm's growing range of lenses, and the sensor and processing engine put in a good performance.

Fujifilm's selfie-friendly AF options are useful for those who like taking pictures of themselves. (Doesn't everyone?) The new kit lens can focus as close as 15cm, so you don't even need a selfie stick.



Below The X-A2 has a solid-feeling metal body.

Digital Camera

FEATURES	BUILD QUALITY
★★★☆☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★☆☆	★★★☆☆

Overall ★★★☆☆

WE SAY: A solid feeling entry-level interchangeable-lens camera which lacks a viewfinder, but has enough features to satisfy novices and enthusiasts on a budget. Image quality is also usually high.



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CSC Fujifilm X-T10 > with 18-55mm XF kit lens: £799/$1,099 > www.fujifilm.com

Retro charmer

Fujifilm's latest SLR-style camera has the feel of the X-T1 with a smaller body and a price, Angela Nicholson checks it out



> THE SPECS	
Sensor	16.3 million effective pixels APS-C format X-Trans CMOS II
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	0.39-inch 2,360k-dot OLED
Video	Full HD (1,920x1,080)
ISO range	200-6,400, expandable to ISO 100-51,200 for JPEGs
Autofocus points	15–77 depending upon mode
Max burst rate	8fps
Screen	Tilting three-inch LCD with 920,000 dots.
Shutter speeds	30–1/4,000 sec with mechanical shutter, plus Bulb; or 1–1/32,000 sec with electronic shutter
Weight	331g (body only)
Dimensions	118x83x41mm
Power supply	NP-W126 lithium-ion battery (supplied)

"Fujifilm hasn't compromised with the X-T10's hybrid autofocus system."

Because of its solid build, retro styling, traditional controls and excellent image quality, the Fujifilm X-T1 is one of my favourite cameras. It's also proved very popular among enthusiast and professional photographers looking for a smaller alternative to a bulky advanced SLR.

Now we have the Fujifilm X-T10, a slightly more compact Mini-Me of the X-T1 that uses the same APS-C format 16-megapixel X-Trans CMOS II sensor and EXR processor.

Being a little smaller and more affordable than the X-T1 means that the X-T10 makes a few compromises. One of these is with the electronic viewfinder (EVF): although it has the same 2.36-million dot resolution as the X-T1's, it's the smaller (0.39-inch) device that's found in the Fujifilm X-E2, with 0.62x magnification rather than 0.77x. This means that it isn't possible to see a dual image, with a magnified view alongside the full image. However, like the X-T1's EVF, there's a lag time of just 0.005 seconds, rather than 0.05.

1 The tilting screen is good, but the EVF is a better option for composing images in very bright sunlight.

2 If this dial and the lens aperture ring are set to A, the camera is in Program mode.

3 This button is used to enter AF point selection mode.

4 This dial enables you to set exposure compensation between -3 and +3EV.

One area where Fujifilm hasn't compromised is with the X-T10's hybrid autofocus system – it's the updated version of the X-T1's. In single autofocus (AF-S) mode there are three options for setting the focus point: Single, Zone and Wide; and in continuous autofocus (C-AF) mode, there are Single, Zone and Wide/Tracking options. When you shoot in Single shot or Continuous Low shooting mode and Zone AF mode, the X-T10 has 77 user-selectable autofocus points (rather than the 49 available in Single AF mode). These can be selected individually or in groups of 3x3, 3x5 or 5x5. When Continuous High shooting mode is selected, the number of AF points drops to 15 around the centre of the frame, and the zone can be set to the whole area or a 3x3 square.

Other specification highlights of the X-T10 include a pop-up flash in addition to a hotshoe; a native sensitivity range of ISO 200-6400 with JPEG-only expansion settings taking this to ISO 100-51,200; a UHS-I SD/SDHC/SDXC card slot; a maximum continuous shooting



Post-capture raw file conversions give the best results, but the X-T10's black-and-white Film Simulation mode is pretty good straight from the camera.

rate of 8fps for eight images; Wi-Fi connectivity; and the same electronic shutter found in the X100T and X-T1, giving shutter speeds up to 1/32,000 sec. To help less experienced photographers, there's also a fully automatic mode.

BUILD & HANDLING

The X-T10 doesn't have the weather-resistant build of the X-T1, like other X-series CSCs, but it's pleasantly solid with a die-cast magnesium alloy construction. From the front and rear, it doesn't look much smaller than the X-T1; but from above, it's clear that the new camera is slimmer. The front and rear grips are also less pronounced, but thanks in part to their super-grippy covering, the camera feels safe and comfortable in your hands, even with a large lens on.

Like the X-T1, the X-T10 has traditional exposure controls, but there's no sensitivity dial. However, sensitivity can be set via the main menu or the Quick menu, or alternatively, one of the physical controls can be customised to access the ISO values.

The electronic viewfinder is noticeably smaller than the X-T1's, but it's still very good, and shows the image as it will be captured. Details are clear, and the high refresh rate makes it possible to follow fast-moving subjects.



1 **FAST AF**
In Continuous AF and Zone AF mode, the X-T10 was able to latch on to fast-moving skateboarders and keep them sharp as they moved, even in low light.

2 **IN A BURST**
In Continuous High-Speed (CH) mode, the X-T10 can shoot up to eight images at 8fps, but you can shoot at 3fps until the card is full in Continuous Low-Speed mode.

3 **NOISE CONTROL**
This shot was taken at ISO 1,600, and there's good balance between detail and noise control. An aperture of f/2.8 has restricted the depth of field to give separation.

Meet the rivals...

The cameras that compete with the Fujifilm X-T10

For test images and resolution charts, visit www.techradar.com/cameras



Sony Alpha 6000
£495/$698 with 16-50mm kit lens
This 24MP APS-C format compact system camera has an excellent autofocus system and a built-in viewfinder, but like the X-T10, the screen isn't touch-sensitive.
Reviewed: issue 155



Pansonic Lumix G7
£679/$978 with 14-42mm kit lens
Part of the Micro Four Thirds family of compact system cameras, the 16Mp G7 has touchscreen control, a vari-angle screen and an excellent viewfinder.
Reviewed page 104



Olympus E-M10
£449/$530 with 14-42mm EZ kit lens
A 16MP Micro Four Thirds compact system camera with a tilting touchscreen and high quality viewfinder. The E-M10 delivers some really great-looking images.
Reviewed page 94



There's an impressive level of detail on this artist's canvas, hand and sleeve. Using the default Provia Film Simulation mode has also produced natural, life-like colours across the



At 100% on-screen, some out-of-focus areas of this ISO 6,400 JPEG look a bit mushy, but it looks great at print size.

PERFORMANCE

Like the X-T1, the X-T10 is capable of capturing an impressive level of detail, and images have pleasant colours. Noise is also controlled well throughout the native sensitivity range, and even the maximum setting (ISO 6,400) results in images that have enough detail to make nice A3 (297x420mm) prints. As usual, raw files have some chroma noise, but this can be controlled easily.

A key criticism of previous X-series compact system cameras has been the autofocus performance with moving subjects. The autofocus system improvements brought by the X-T10, and rolled out to the X-T1 with a firmware upgrade, are designed to address the issue. It's a big improvement. In Continuous Wide/Tracking mode, it does a reasonable job of locking on to a moving subject and tracking it around the frame, but busy surroundings can be a distraction, so Zone AF or Single point mode is often a better option. Provided the active zone or single point is kept over the subject, the camera does a good job, delivering sharp images on most occasions, even in subdued light.

It would be nice if the focusing points could extend a little further out from the centre of the frame when shooting at the X-T10's maximum rate (8fps), but it's not a major issue in many situations.

Like other Fujifilm X-series compact system cameras, the X-T10 tends to produce JPEG images with quite high mid-tone contrast. This heightens teh sense of detail and makes the images look sharp, vibrant and film-like, but their dynamic range isn't especially high.

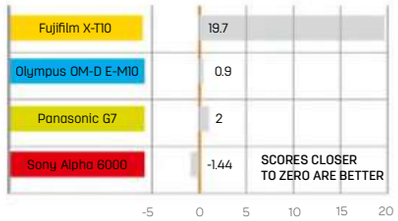
The general purpose Multi-zone metering system is also a little prone to producing bright images, so it's a good idea to keep an eye on the histogram to make sure that brighter areas aren't lost. Some highlight detail is usually recoverable from raw files, but you still need to take care and keep an eye on the histogram view on the back of the camera.



Noise is controlled well throughout the native sensitivity range of ISO 200-6,400

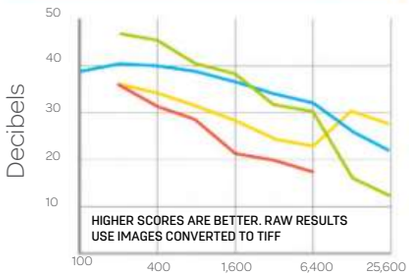
WHAT'S THIS? Find out how we test on page 6

COLOUR ERROR



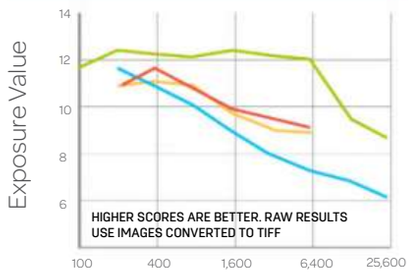
In the default settings, the X-T10 produces the most saturated images of the cameras. This could be enhanced by the relatively high mid-tone contrast of JPEG files..

RAW SIGNAL-TO-NOISE RATIO*



This indicates that the X-T10's files are noisier than those from two of the competing cameras, but real-world images generally look great, with a good level of detail.

RAW DYNAMIC RANGE*



The X-T10's raw files have a much wider range of tones than the JPEGs, giving greater scope for adjustment of contrast. The JPEGs have attractively high mid-tone contrast.

Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★☆☆
PERFORMANCE	VALUE
★★★★☆	★★★★☆

Overall ★★★★☆

WE SAY: The X-T10 is a great CSC for those wanting to get serious about their photography, but it's also a good choice for those looking for a backup to their X-T1 or SLR. The X-T10 is a compromise on the X-T1, but it's not muchof one – producing the same high-quality images, and with a vastly improved AF.

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> THE SPECS	
Sensor	Four Thirds type with 16.84 million pixels (12.8 million effective)
Focal length conversion	N/A
Memory	SD / SDXC / SDHC
Viewfinder	0.38-inch electronic viewfinder with 2,764,000 dots
Video	4K (3,840x2,160)
ISO range	200–25,000; expandable to 100–25,000
Autofocus points	49
Max burst rate	40 frames per second with focus set at start; 6.5fps with continuous AF
Screen	3-inch 921k-dot LCD
Shutter speeds	Mechanical shutter, 1,4000–60 sec; electronic shutter, 1/16,000–1 sec
Weight	365g
Dimensions	117 x 66 x 61mm
Power supply	Rechargeable Li-ion battery



COMPACT Leica D-Lux (Typ 109) > £825 / $1,052 > www.leica-camera.com

Luxury goods

The D-Lux (Typ 109) is Leica's version of the Panasonic LX100. **Angela Nicholson** investigates if it's worth the extra money

The Leica D-Lux (Typ 109) is a rather unusual camera. Thanks to a working agreement between Leica and Panasonic, it's almost identical to the Panasonic LX100, one of our favourite cameras of 2014. There is a price premium to pay for the Leica model, but this also brings a three-year warranty, and Lightroom 5 is included on a disc in the product box.

For those unfamiliar with the LX100, the sensor is a Four Thirds-type; according to Panasonic, it's the same 16MP sensor used in the Panasonic GX7, but it only uses a maximum of 12.5 million pixels (in 4:3 mode). As it's a multi-aspect ratio sensor, 3:2 and 16:9 images use pixels that lie outside the area used by the camera in 4:3 mode.

This sensor is coupled with a new Panasonic Venus engine, which enables a native sensitivity range of ISO 200–25,000 (with expansion settings taking it to ISO 100–25,000) and 4K or Full-HD video recording.

Like the LX100, the D-Lux has a Leica DC Vario-Summilux 24-75mm (equivalent) f/1.7-2.8 lens. As with the rest of the camera, although this lens has Leica's name on it, it is actually built by Panasonic. The company has invested a lot of effort to keep size down while ensuring it's a high quality optic.

Above There's no denying that the D-Lux is a fine-looking camera.

BUILD AND HANDLING

The D-Lux (Typ 109) is aimed at experienced photographers who want a high-quality compact camera that affords plenty of control. It doesn't disappoint: it has a high-quality feel, along with traditional controls (including a shutter speed dial, aperture ring and exposure compensation dial) to allow quick exposure adjustments. The aspect ratio can also be changed (between 3:2, 16:9, 1:1 and 4:3) using a sliding switch on the lens barrel, just next to the manual focusing/zoom ring, and there's a switch on the lens to select focus mode.

Further good news is that the 2,764k-dot electronic viewfinder (EVF) is very good and provides a nice, clear view. It's especially useful in bright conditions, where the 3-inch 921k-dot screen can suffer from reflections, as do most screens.

However, the front grip that's on the front of the LX100 is completely missing from the D-Lux. This makes it feel rather insecure in your hand, especially in cold weather. There is an optional front grip available that attaches via the tripod bush, although

Meet the rivals...

The cameras taking on the Leica D-Lux



Panasonic LX100
£598 / $798
The same spec as the D-Lux, with a shorter warranty. Its front grip is a plus over the D-Lux.
Reviewed: issue 159
★★★★★



Fujifilm X30
£319 / $500
The same 12MP 2/3-inch X-Trans CMOS II sensor and 28–114mm f/2.-2.8 lens as the X20, in a larger body coupled with an EVF.
Not reviewed



Fujifilm X100T
£846 / $1,299
Its 16MP APS-C format sensor and Fujinon 23mm f/2 lens give this compact bags of appeal.
Reviewed: issue 161
★★★★★



this arguably spoils the clean lines of the camera.

PERFORMANCE

Like the LX100, the D-Lux (Typ 109) produces impressive results. Images taken in daylight have lots of detail, natural colour and good tonal range, and distortion is controlled well. As usual, the highest-quality results are produced at the lower sensitivity settings, and the maximum setting (ISO 25,000) is best avoided.

Dropping down to ISO 6,400 results in much better images and, although we'd still recommend shooting raw files, JPEGs are suitable for making A3 prints. Ideally, it's best to keep the sensitivity to ISO 1,600 or lower, where the image quality is very good, noise is controlled well and there's plenty of detail.

Even in fairly low light, the D-Lux's autofocus system manages to get subjects sharp quickly; it only starts to struggle in dark conditions. The general-purpose metering system does a good job, but it sometimes produces quite bright images. It can be beneficial to reduce the exposure by 1/3 or 2/3EV to get more saturated colours or to protect the highlights.

Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★★	★★★★☆

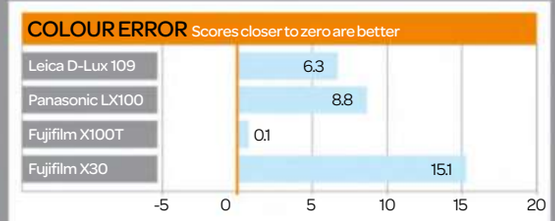
Overall ★★★★☆

WE SAY: The D-Lux is a delight to use. It produces high quality images, but the Panasonic LX100, which has the same spec, feels safer in your hand, thanks to the front grip that's missing from the Leica camera.

WHAT'S THIS? Find out how we test on page 6

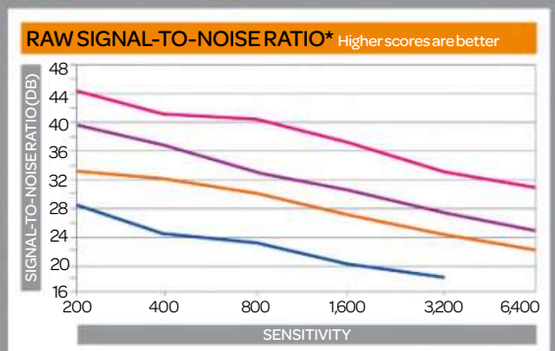
CAMERA BENCHMARKS

How does the D-Lux fare against the rest?

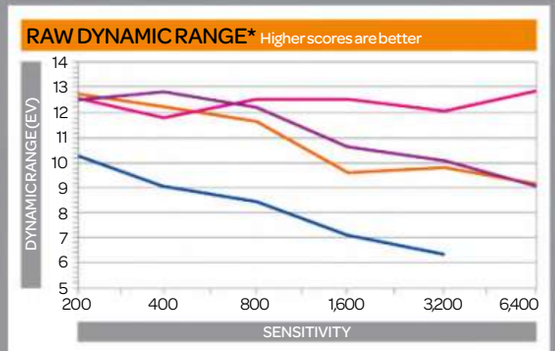


COLOUR ERROR RESULT: It lacks the accuracy of the Fuji X100T, but the D-Lux scores pretty well, producing vibrant images.

KEY: Leica D-Lux 109 · Panasonic LX100 · Fujifilm X100T · Fujifilm X30



NOISE RESULT: The LX100 and D-Lux stand up well to the competition from the X100T's larger sensor. Noise is controlled well.



DYNAMIC RESULT: This indicates that the D-Lux captures a wide range of tones at the lower sensitivity settings.

OVERALL BENCHMARK RESULT

These figures show the results when the raw files from the LX100 and D-Lux are processed using their own supplied software (Silkypix and Lightroom respectively). When they are both processed using Adobe Camera Raw, the results are a very close match.

* Raw results use images converted to TIFF



Above The D-Lux's images are vibrant and full of detail.

Right That's an aperture ring towards the front of the lens.



SLR Nikon D3300 > £334 (body only) > www.nikon.co.uk

> THE SPECS	
Sensor	24.2 million pixel APS-C sensor
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	Optical viewfinder with 95% coverage, 0.85x magnification
Video resolution	Full HD (1,920x1,080)
ISO range	ISO 100-12,800 (expandable to 25,600)
Autofocus points	11
Max burst rate	5fps
LCD screen size	3-inch, 921,000 dots
Shutter speeds	1/4,000-30 seconds
Weight	460g (including battery and memory card)
Dimensions	124x98x75.5mm
Power supply	EN-EL 14a Li-Ion battery

Star starter SLR

Nikon's new D3300 has a great deal to offer anyone who's shopping for their first SLR, as **Amy Davies** discovers

Cameras at the bottom of Nikon's range always spring to mind as recommendations for beginner photographers. The Nikon D3200 was an excellent performer, and its replacement the D3300 promises to deliver a camera of a similarly high standard.

In common with other camera manufacturers, Nikon tends to incorporate elements of technology from its more advanced models in its starter range. The D3300 looks set to be another good choice for beginners. It offers the same 24.2 million-pixel count as the D3200, but it lacks the optical low-pass filter over the sensor and should therefore capture sharper, more detailed images.

Removing the anti-aliasing filter is something we've seen mainly on professional and enthusiast level cameras so far. A potential downside to removing AA is that it increases the chance of moiré patterning appearing on some images — usually when you photograph something with repeating or close patterns.

Enthusiasts and professionals don't usually have a problem removing such patterning afterwards in post-processing, but it's rather interesting that Nikon should choose this design for an entry-level model, whose owners are less likely to use image-editing software to perform such a task.

Nikon claims that the high pixel count found on the D3300 almost eliminates the risk of the patterning occurring. We'll be keen to find out how true that is.

Along with the sensor redesign, Nikon has also improved the user interface and the Guide mode, to give it more functionality and make it a little cleaner in appearance.

FEATURES

Like the Nikon D5300, the new D3300 has the manufacturer's latest-generation Expeed 4 engine. This allows the new camera to shoot up to 100 fine-quality JPEGs continuously at a maximum rate of 5fps. In addition, the native sensitivity range runs from ISO 100 to 12,800 and there's an expansion setting that takes it to the equivalent of ISO 25,600.

Also like the D5300, the D3300 has an Effects mode that allows a collection of styles to be applied to JPEG images and video. These include Pop and Toy Camera, while there's an Easy Panorama mode too.

The D3300 also has a dedicated 420-pixel RGB sensor to gather exposure, white balance and focus information for the Automatic Scene Recognition system.

Above The D3300 boasts many updated features

Although the D3300 uses the same battery as the D3200, Nikon claims that the new processing engine allows it to be more efficient in its power consumption, meaning that the battery life can last for around 700 shots.

BUILD AND HANDLING

Nikon has slightly reduced the size of the camera compared with the D3200, but placing the two side by side doesn't reveal too dramatic a difference. The grip is still deep and comfortable to hold, with the textured grip making it feel particularly secure in the hand.

The D3300 has a pleasingly modern appearance. The high-res screen gives the display beautifully rounded edges and shows the interface's colours well. When shooting, the camera displays three circles to represent shutter speed, aperture and sensitivity (ISO). These displays change as you adjust settings



Toy Camera and Panorama shooting are under the Effects mode.

FEELING TREATED



With up to 700 shots per charge, the D3300 is fantastic for holidays.



Options are controlled via the screen, but it's not touch-sensitive.

FEELING CHEATED



You need to switch the timer on every single time you want to use it.

Zooming in on the... Nikon D3300

A quick tour of the camera's key features



Use this scrolling dial to alter aperture or shutter speed, depending on the mode you're shooting in.



The D3300's viewfinder only offers a 95% field of view, so you'll need to bear that in mind when composing shots.



You can press the i button to access a quick menu for the most commonly-used settings, such as white balance.

Instantly access the camera's Live View shooting mode by hitting this button.





using the scrolling dial or buttons; the most obvious is the aperture circle, which closes and opens to represent the aperture blades adjusting.

A dial on the back of the camera is used for altering the aperture or shutter speed, depending on the mode you're shooting in. When in Manual mode, and needing to control both functions, you'll have to hold down the exposure compensation button while scrolling the dial to switch between the two parameters.

There aren't a huge number of buttons on the D3300, which is unsurprising for an entry-level camera. On the top plate you'll find a mode dial for switching between exposure modes, such as fully automatic, Aperture Priority and the newly-incorporated Effects mode. Also on the top plate you'll find the exposure compensation button (for use in automatic and semi-automatic modes) and an info button, which helpfully turns off the rear display, preventing it from being a distraction while using the viewfinder.

> "There's a function button near the lens mount, which allows you by default to change the ISO"

A quick menu is accessed by pressing a button labelled 'i' on the back of the camera. After it has been pressed, use the directional keys to travel to a setting you want to change – such as white balance, then press OK to bring up the different options available to you. Unfortunately, this menu isn't customisable, so if there's something on this menu you rarely use, you're stuck with it.

There's also a function button near the lens mount, which allows you to quickly change the sensitivity. You can change it to a couple of other options if you prefer, but the choice isn't huge – which again is a shame.

Changing the AF point is simple. All you need to do is press the directional keys to move around the point you need. As the central AF point is cross-type, it is more sensitive than the others, so you may find it beneficial to focus and recompose in certain situations, or if you're just aiming for speed.

The viewfinder is optical and offers a 95% field of view. While it is bright and clear, not being 100% means that

Meet the rivals...

See how the D3300 stands up against the competition



Canon EOS 100D
£349 (body only)
The world's smallest digital SLR features an excellent sensor and is a great first swappable-lens camera.
Reviewed: page 46



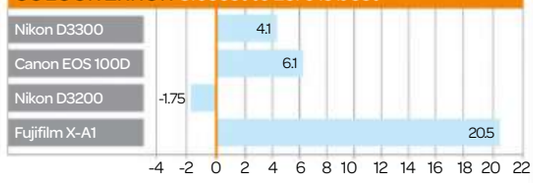
Nikon D3200
£310 (body only)
You should be able to get good deals on the previous model, which is great for beginner photographers.
Reviewed: issue 127



Fujifilm X-A1
£379 (with 16-50mm lens)
An ideal first CSC with excellent image quality; its small size makes it perfect for those looking for something lightweight.
Not reviewed

CSC BENCHMARKS
How does the Nikon D3300 measure up?

COLOUR ERROR Closest to zero is best

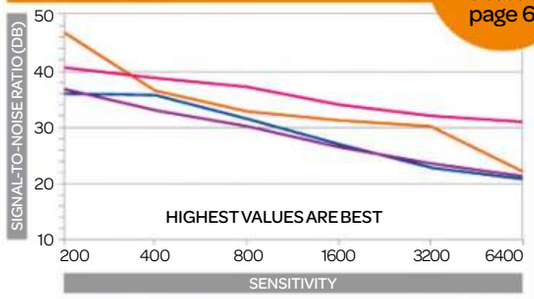


COLOUR ERROR RESULT: JPEGs show good natural colour, though it's not a match for the Sony RX100's excellent colour reproduction.

KEY: Nikon D3300, Canon EOS 100D, Nikon D3200, Fujifilm X-A1

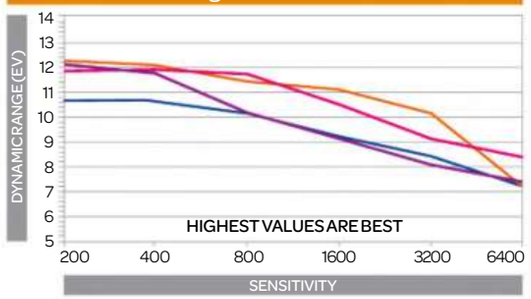
WHAT'S THIS? Find out how we test on page 6

TIFF NOISE Highest values are best



NOISE RESULT: At face value the D3300 looks the worst performer. But this just shows it favours detail reproduction over noise reduction.

TIFF DYNAMIC RANGE Highest values are best



DYNAMIC RESULT: Raw format files (after conversion to TIFF) show a consistent result, fairly closely matching the other cameras on test.

OVERALL BENCHMARK RESULT
The D3300 performs similarly to the D3200 in some respects, especially in terms of dynamic range. It beats the Canon EOS 100D at the lower end of the scale before dropping below it from ISO 1,600 and above for JPEG files. The noise results show that the removal of the anti-aliasing filter has increased detail reproduction, which is favoured over noise reduction.

there is a chance of something appearing in the final image that you didn't notice in composition. Fortunately, with such a high pixel count, if you need to crop an image later, overall image quality shouldn't drop too much.

PERFORMANCE
We were big fans of the both the D3200 and the D3100, so we had pretty high hopes that the D3300 would continue this impressive beginner line-up. Nikon entry-level cameras usually offer quite a lot for the cash, and the D3300 is no different in that respect.

The big difference between this camera and its predecessor is the removal of the anti-aliasing filter, which improves detail resolution. Zooming in to 100% reveals very fine details. Happily, we've not come across any examples of moiré patterning when shooting stills either, suggesting Nikon's claim that removing the filter presents less of a problem for high-pixel-count cameras is accurate.

With such a high pixel count (24 million), there comes the increased chance of noise appearing in images. Like the D3200, the D3300 handles low-light, high-sensitivity situations well. Noise only really starts to become apparent when shooting at ISO 3,200 or above; even then it's acceptable, or certainly preferable to a blurred or missed shot.

In the majority of shooting conditions, all purpose metering does a good job of producing accurate exposures. The camera can get a little confused if you're shooting something with high contrast. Switching to spot metering, or dialling in some exposure compensation helps to reduce this if the camera is struggling.

Similarly, the white balance system is impressive, managing to produce accurate colours even while shooting indoors. Shooting under normal household artificial light produces images that are close to accurate, hardly erring towards warm tones at all, which is excellent to see in a



Above right The new Effects mode gives you plenty of scope to get creative with your pictures while you're shooting



Tech Briefing
Retractable kit lens



Fighting a battle against compact system cameras means reducing the size of an SLR wherever possible. Probably the most noticeable reduction here is the new retractable 18-55mm kit lens, which comes packed with the D3300 as standard and offers a 30% reduction in size from the previous 18-55mm lens.

A mechanism allows for the lens to be retracted when not in use, but it does add the step of extending the lens before you can take your first shot. It also features a vibration reduction (VR) function, which means you can shoot up to four stops faster. The minimum focusing distance is just 0.25m (with manual focusing), making it useful for macro shooting.

beginner camera.

Autofocusing speeds are pretty quick, especially in daylight or well-lit conditions. It's rare for the kit lens to hunt around to acquire focus, and rarer still for it to present a false confirmation of focus. Speeds drop a little in lower-light conditions, but it's only when it's extremely dark that the lens struggles to focus at all.

Above The 18-55mm kit lens is a great all-round performer for your first lens



Below You can access the Effects mode straight from the dial

It's worth bearing in mind that focusing speeds drop significantly when using Live View, so its use is only really recommended if you're shooting something stationary, or if you're shooting from an awkward angle and can't manage to compose using the viewfinder.

VERDICT

Nikon continues to impress in this segment of the market. While the entry-level area may not seem like the most lucrative, hooking somebody at the beginning of a buying career is key to long-term sales, so it's no surprise to see companies such as Nikon pulling out all the stops.

You get a lot of seriously good kit for your money. For starters, there's the 24 million-pixel sensor, which, with its AA filter-less design is capable of producing more detail than the previous version of the camera, and gives you the bonus of being able to crop into the scene for extra reach.

Updating the user interface to give it a crisp and clean look is also a smart move, keeping the camera looking fresh. The Guide mode continues to be something that makes this camera appealing to novice users – not having to dig out the manual or search online for help is especially useful when you're out shooting with the camera and get a little stuck.

It's a bit of a shame that this camera doesn't have built-in Wi-Fi, as this would probably have been more enticing to beginner users who are used to sharing their shots quickly from smartphones. There's also no touch or articulating screen. Although it's to be expected at this price point, it makes some of the entry-level compact system cameras that do offer this functionality look more appealing.

The D3300 will goes head to head with the Canon EOS 1200D, which seems a little lacklustre next to Nikon's offering, although the 1200D is cheaper.

Digital Camera

FEATURES	BUILD/HANDLING
★★★★☆	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★☆

Overall ★★★★★

WE SAY: With its high resolution, the D3300 satisfies those who crave the megapixels without skimping on image quality. Just about the best beginner-level SLR on the market, this is an excellent buy.



> THE SPECS	
Sensor	24.2MP DX format (APS-C) CMOS sensor (23.5 x 15.6mm)
Focal length conversion	1.5x
Memory	SD / HC / XC
Viewfinder	Eye-level optical pentamirror viewfinder, 95% coverage
Video	Full HD (1,920 x 1,080)
ISO range	100–25,600
Autofocus points	39
Max burst rate	5fps
Screen	3.2 inch 1,037k-dot TFT vari-angle touch-sensitive LCD
Shutter speeds	1/4,000–30 sec
Weight	470g (with battery and memory card)
Dimensions	124 x 97 x 70 mm
Power supply	Rechargeable Li-ion battery

SLR Nikon D5500 > With 18-55mm lens: £599 / $845 > www.nikon.com

Get in touch

With the launch of the D5500, at last we have a touchscreen on a Nikon SLR. **Amy Davies** discovers what else is new

The D5500 features the same 24.2-million-pixel APS-C sized (DX format) sensor as its predecessor, the D5300. It's a sensor that has no anti-aliasing filter, which makes it better suited to capturing fine detail, at the possible risk of some moiré patterning in particularly fine textures. There's also the same Expeed 4 processor as the D5300, and a 3.2 inch 1,037,000-dot vari-angle LCD - but, it is now touch-sensitive. Remarkably, the D5500 is Nikon's first SLR to include a touchscreen; Canon started adding the technology to some of its EOS models as far back as 2012.

Like the D5300, the D5500 uses a rechargeable EN-EL14a battery, but Nikon says that battery life has been increased from 600 shots in typical use to an even more impressive 820.

As standard, the D5500 ships with the same 18–55mm collapsible kit lens that comes with the D5300. You can also buy it body-only if you already have some lenses in your kit.

In the market, the D5500 will be going head-to-head with Canon's upcoming EOS 760D and 750D SLRs, which both also feature 24.2-million-pixel sensors.

BUILD AND HANDLING

Just like the D5300, the D5500 body has a monocoque construction, meaning its shell is made from a single piece of material. However, it is slimmer than its predecessor, especially between the lens mount and the grip. This thinning has meant that the internal layout of the camera has had to be redesigned, but it results in a deeper grip, which makes the camera feel more secure in the hand.

If you're using the D5500 with the 18–55mm kit lens, you'll need to hold down a button on the side of the lens to extend the optic before you take your shot. You can leave the lens extended for the next shot to speed things up.



Above Nikon's 39-point phase-detection autofocus system is fast and accurate.

The D5500's top plate sees a slight redesign compared with the D5300. A simplified mode dial contains just eight different exposure modes, including Automatic, semi-automatic and Manual settings. Around the mode dial is a switch for activating Live View shooting, which is very easy to quickly flick on and off when you need it.

The D5500 offers our first opportunity to discover how a touchscreen affects the way you use a Nikon SLR. The basic functionality is straightforward. You can make settings changes using the screen, simply by tapping the 'i' icon in the bottom-right corner. From here, you can tap the setting you wish to change (such as White Balance), then tap the particular setting you want to use.



Stick or twist? Upgrade advice

If you're looking for your first SLR, the D5500 represents a tempting little package. But if you're on a budget and are mainly concerned with image quality, the D5300 (pictured) offers the same image quality in a cheaper body. If you already have a D5300, the incentive for upgrading will be the touch-sensitive screen – something which will appeal to some and not so much to others. It's worth noting too that the D5300 has a GPS location unit, which is absent in the D5500.

Zooming in on the... D5500

Most buttons are in easy reach



The viewfinder only offers a 95% field of view, something you should bear in mind.



The touch-sensitive screen clearly shows your settings and AF point. The 'i' icon gives you access to shooting menus.





This dial's function varies with shooting mode. For example, it controls aperture in Aperture Priority.



This physical 'i' button corresponds with the virtual one that appears on the touchscreen.

A small indent helps you to release the articulating screen and move it into a comfortable position.



Use the directional keys to set the AF point while you're looking through the optical viewfinder.



If you don't like using touchscreens, there is an equivalent physical button marked with the same 'i', and you can navigate to the setting you want to use with the directional keys instead.

You can also use the touchscreen to adjust settings while you're using the optical viewfinder, for example changing the autofocus point. This is a good idea in principle, but in practice I had mixed results with it unless I articulated the screen away from my face - something which feels a little awkward.

When you use Live View, you can also use the touchscreen to set the AF point. Just tap the point of the screen where you want to focus. You can also enable touch-shutter, which means that the camera will fire off the shutter release as soon as focus has been acquired.

> "Images are very pleasing, with bright but accurate colours in the majority of situations"

One downside to the reliance on the touchscreen is that it can seem a little slow to change certain settings, as you have to go through the 'i' menu. There is one function button near the lens mount, which you can set to an often-used setting, such as sensitivity, but otherwise you're reliant on the screen.

The D5500's built-in Wi-Fi connectivity means it's easy to link the camera to Nikon's Wireless Mobile Utility app on your iOS or Android smartphone – but sadly, it's still only possible within the app to set the AF point and fire off the shutter release remotely. You can't change any other settings. It's still useful for some situations, such as taking group shots.

PERFORMANCE

With an identical sensor and processor to its predecessor the D5300, we weren't anticipating any real surprises from the D5500. As before, images are very pleasing, with bright but accurate colours in the majority of situations.

The lack of an anti-aliasing filter makes for some great detail in shots, even when you're using the kit lens.

If you wish to change the colour settings, you can use Picture Controls, such as Vivid, to boost colour. There are also other options, such as Landscape and Portrait. These are

Meet the rivals...

The cameras taking on the Nikon D5500



Canon 700D / Rebel T5i
With 18–15mm lens:
£469 / $699
A capable 18MP model that's soon to be replaced by the 750D and the 760D.
Reviewed: issue 140
★★★★☆

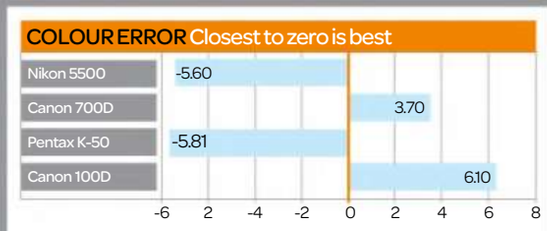


Canon 100D / Rebel SL1
With 18–15mm lens:
£349 / $499
The smallest SLR in the world is now available at a bargain price.
Reviewed: page 46
★★★★☆

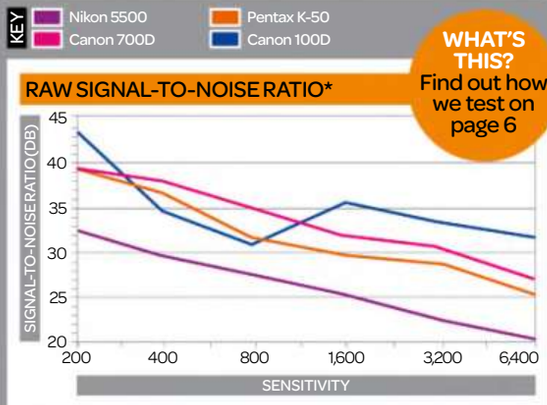


Pentax K-50
With 18–15mm lens:
£379 / $378
With a 16MP sensor, this weatherproof all-rounder is well-suited to beginners. There's no Wi-Fi, though.
Not reviewed

CAMERA BENCHMARKS
How the Nikon D5500 fared against others

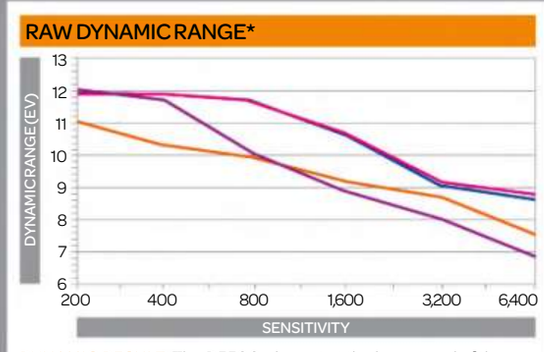


COLOUR ERROR RESULT: Although not the most accurate on test, the D5500's colours are pretty true-to-life in real-world shooting.



WHAT'S THIS? Find out how we test on page 6

NOISE RESULT: Looking at these results, the Nikon fares worst. This is likely to be due to the amount of detail the sensor is able to capture.



DYNAMIC RESULT: The D5500 wins out at the lowest end of the sensitivity scale, before being taken over by the Canon 700D.

OVERALL BENCHMARK RESULT
The Nikon D5500 performs reasonably well in the labs. Although it is beaten by some of the other cameras in the test in some areas – notably the signal-to-noise scores – in real-world shooting the differences are less marked than the results might suggest.

* Raw results use images converted to TIFF



useful to have to hand, and it's good that you can use these while shooting in the camera's raw format should you need a clean version for post-capture processing down the line.

Reviewing images taken in the D5500's JPEG mode at normal printing and web sizes, the overall impression of detail balances well with the appearance of noise in shots taken at higher sensitivities. It's only from around ISO 3,200 that you can see image noise present at these sizes, and even those taken at ISO 6,400 remain usable at small sizes.

Above Colours are punchy direct from the camera, but without going too far over the top with vibrance.

As we have found before, Nikon's 39-point phase detection AF system is fast and accurate. Even when using the supplied kit lens, the D5500 is generally able to lock onto a subject with ease, especially in good light.

Unfortunately, shooting in Live View remains a frustratingly slow process. While it's useful for shooting still-life or macro subjects and seeing an enlarged view of the scene to get the focus just right, for other subjects it's just not practical to use.

On the whole, the D5500's metering system does a pretty good job of helping to produce accurate exposures, but dialling in a touch of exposure compensation can be useful in some situations (such as high-contrast scenes) to achieve a more pleasing exposure. Similarly, the automatic white balance system does a good job, although it can sometimes err ever so slightly towards unnatural yellowish tones under artificial light. In those cases, you may find it beneficial to manually set a more appropriate White Balance setting, such as Tungsten, or a custom value. There's a host of digital filters available under Creative Mode. It's worth giving these a look to see if any take your fancy. It's a shame that you can't select a filter while shooting in raw format, so you'd have a clean version should you decide down the line that Photo Illustration was perhaps a mistake.

VERDICT
Like the D5300 before it, the D5500 occupies a useful space in the

market. It's certainly an entry-level SLR, but it has some room for you to to grow as you gain confidence. The D5500 represents a slight upgrade rather than a full overhaul. But the changes that have been made are welcome, and make using the camera a nicer experience than before.

Keeping the already well-performing sensor and processor combination from the 5300, but adding a touch-sensitive screen, means that you have the best of the old, but with an acknowledgement of the new.

The overall feature set of the D5500 is commendable. The high-resolution sensor produces detailed images, while built-in Wi-Fi, a 39-point autofocus system and a touchscreen round off the specs very nicely. It's very much a camera which is a sum of its parts, rather than having one stand-out, attention-drawing feature.

While Nikon hasn't created a game-changer with the D5500, it's still a pleasing entry-level camera that brings a lot of very useful features to anyone getting started in digital SLR photography. It's also an attractive upgrade from a much older model.

If you're on a budget, however, the older D5300 remains available: it has the same image quality thanks to the same sensor and processor, but without the touchscreen. The question is whether the touchscreen is enough to persuade you that the newer model is worth it.

Above Even at high ISOs, there's not too much evidence of noise visible.

Below The slim body allows for a large grip without increasing the overall size.



Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★★	★★★☆☆

Overall ★★★★☆

WE SAY: The D5500 has lots of excellent features which make for a very attractive package for first-time users. Its images are high-quality, and the touch-sensitive screen is overdue in Nikon SLRs.



> THE SPECS	
Sensor	24.2-million-pixel DX-format (APS-C) CMOS
Focal length conversion	1.5x
Memory	2 x SD / SDHC / SDXC
Viewfinder	Eye-level pentaprism viewfinder; 100% field of view
Video	Full HD (1,920 x 1,080) at 60, 50 (1.3x crop mode), 30, 25 or 24p
ISO range	100-25,600 (expandable to 102,400 equivalent, monochrome only)
Autofocus points	51
Max Burst Rate	6fps (DX), 7fps (1.3x crop)
Screen	3.2 inch, 1,229k-dot fixed TFT LCD
Shutter speeds	1/8,000–30 sec
Weight	765g (body only, with battery and memory card)
Dimensions	136 x 107 x 76mm
Power supply	EN-EL15 rechargeable Li-ion battery

SLR Body: £849 / $1,197 > www.nikon.com

Great all round

The Nikon D7200 replaces the D7100 - the body's roughly the same but there are key upgrades. **Amy Davies** checks it out

Roughly two years after the introduction of the D7100, the new D7200 which replaces it seems more like an incremental upgrade than a major overhaul. Inside the camera you'll find a sensor with the same 24-million-pixel resolution as its predecessor, while the external body is identical.

As before, the sensor is missing an anti-aliasing filter, which should again make it extremely capable of resolving fine detail. That's not to say that some of the changes that have been made are not significant, though.

FEATURES

An Expeed 4 processor facilitates an increase in burst depth: Nikon says that the D7200 is capable of shooting up to 27 raw-format files or 100 JPEGs before the buffer fills. There's also an increase in native sensitivity range: it's now ISO 100-25,600, with two special monochrome-only expansion settings which take the sensitivity up to ISO 102,400.

Also included for the first time in a DX format (APS-C) Nikon is the ability to focus down to -3EV, thanks to the inheritance of the Multi-Cam 3500-II 51-point autofocusing system from models that are higher up in Nikon's range.

The D7200 now includes Wi-Fi and, for the first time in a Nikon digital SLR, NFC (Near Field Communication) connectivity. The two wireless technologies should make it easier than ever to establish a remote shooting connection with your phone or tablet, or send pictures across for quick sharing.

Above The D7200 looks like the D7100's identical twin – apart from the name badge.

Staying the same as in the D7100 is a 3.2 inch, 1229k-dot LCD screen, which is fixed and not touch-sensitive. It is joined by an eye-level pentaprism optical viewfinder, which offers 100% coverage.

BUILD AND HANDLING

Nikon has worked hard to make the D7200 look and feel like a high-quality piece of kit. It feels pretty similar to something like the D610 or the D750 when you're holding it. Both the front and rear grip have soft textured coatings, which make it feel nice in the hand, while your fingers sit comfortably thanks to its contoured and shaped grip.

As with the D7100, the D7200 is weatherproof, which gives you the confidence to use it in a range of conditions without concern. It also helps to give it an air of high quality – albeit not feeling quite as rugged as the D810.



Stick or twist? Upgrade advice

If you already own a D7100 (pictured) or a D7000, there are a couple of additions here that may tempt you to upgrade, especially if you're a sports or wildlife photographer and need a better burst depth, or perhaps if you often shoot in low light and would like the higher native ISO range. Otherwise, it's a slightly trickier decision, as many of the features have stayed the same. For those looking to move from something lower down in Nikon's line-up, such as D5300, this makes for an excellent upgrade.

Zooming in on the... Nikon D7200

A layout that's full of clever ideas and touches



Drive mode dial
Choose a drive mode by holding down this small button and rotating the dial. It's a little fiddly, but you get used to it.







AF switch/button
Press the button in the centre to choose an autofocusing method, while the switch can be flicked to choose between manual and auto focusing.



Lock switch
You can lock the control pad using the outside switch – handy for preventing an accidental change to your focus point.



i button
This button acts as a sort of quick menu, but there should be more options available on the menu that pops up.

Fn button
This button can be assigned to one of 18 different settings, and is easily reachable as it's positioned near the grip.







Live view button
Use this to choose between using the viewfinder and the screen to compose your images. The switch allows you to flick between video and stills shooting.

This is very much a camera that requires both hands to use and, as we'd expect from this level of camera, there's a good range of dials and buttons for making changes to key settings quickly and easily. If you're a D7100 owner, you will feel extremely familiar with both the button and menu layout, but if you're coming from a different Nikon model, you should also feel at home.

> "The optical viewfinder is bright and clear. It's great to see a 100% offering on a camera at this level"

The optical viewfinder is bright and clear. It's great to see a 100% offering on a camera at this level, as it means you'll never have something unexpected creeping into the edges of the frame. When shooting macro or still-life scenes, it's advisable to use the rear LCD screen, which offers a magnified view for checking critical focus. It would be nice if the screen was articulated or tilting, though, to help with awkward angles.

Connecting to a smartphone via Wi-Fi is easy, but the control is hidden away a little in the main menu. A dedicated button for quicker access would have been better. NFC is included – but, despite several attempts, I wasn't able to get it to respond to my Android phone. The Nikon Wireless Utility app is also very limited, only offering the ability to set autofocus point and trip the shutter. Nevertheless, it's useful for group shots, or if you want to shoot from a tricky angle.

Meet the rivals...

The cameras taking on the Nikon D7200



Canon EOS 70D
Body: £734 / $999
A fantastic all-rounder, with Wi-Fi and great image quality. It's also got an articulating touchscreen.
Reviewed: issue 144
★★★★★



Fujifilm X-T1
Body: £879 / $1,299
Beautiful retro design makes the X-T1 an ideal camera for enthusiasts who like traditional controls.
Reviewed: page 16
★★★★★



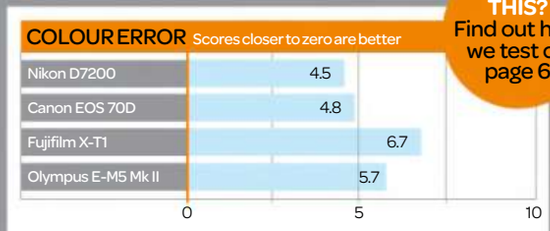
Olympus OM-D E-M5 Mark II
Body: £869 / $1,050
An powerful CSC with usability that gives SLRs a run for their money.
Reviewed: page 98
★★★★½

PERFORMANCE

The 24.2MP sensor and Expeed 4 processor combination has already

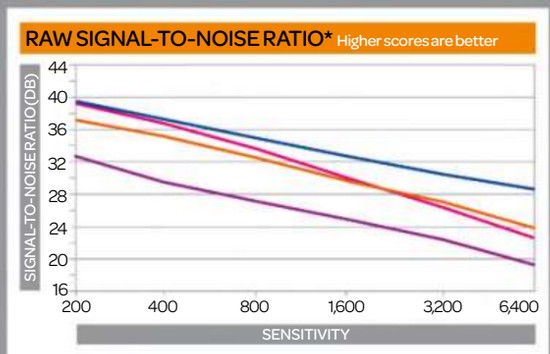
CAMERA BENCHMARKS
How does the Nikon D7200 fare?

WHAT'S THIS? Find out how we test on page 6

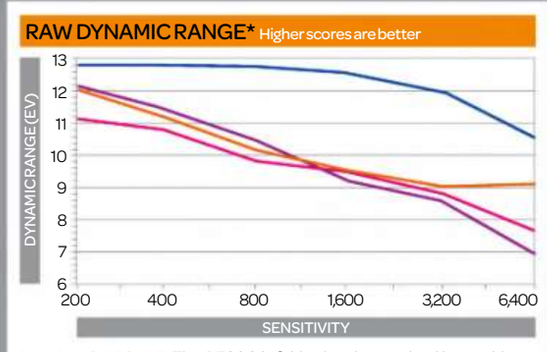


COLOUR ERROR RESULT: The D7200 is closely matched with the Canon 70D. Both can produce beautiful tones in real-world shooting.





NOISE RESULT: The D7200 comes bottom here. This could be a result of Nikon's processing favouring detail over noise, though.



DYNAMIC RESULT: The D7200 is fairly closely matched here with the Fujifilm X-T1, but it performs slightly better than the 70D.

OVERALL BENCHMARK RESULT

Unsurprisingly, the D7200 is better at detail resolution than the Canon EOS 70D, while it is very closely matched with the Fujifilm X-T1. Both the 70D and the X-T1 generally perform better than the D7200 for JPEG signal-to-noise ratio, although the Nikon fares better at higher sensitivities. Meanwhile, for JPEG dynamic range, the D7200 and 70D are very closely matched, and are both better than the X-T1.

* Raw results use images converted to TIFF



Above As you can see, the D7200 produces lovely natural tones.

proved itself to be great partnership in the Nikon D5500, which sits underneath the D7200 in Nikon's line-up, so we were fully expecting good things from the D7200.

This camera is aimed broadly at enthusiasts, who want to shoot a bit of everything, so it needs to be a fantastic all-rounder, capable of handling lots of different subjects. Looking at JPEG images directly from the camera, colours have a great vibrancy, with a bright but natural appearance. Colours are vivid and bold in good light, but even under different lighting conditions, you still get a nice warmth and saturation.

Detail is also excellently resolved. Examining images at 100% reveals some very fine detail, with pretty much zero evidence of image-smoothing at lower sensitivities. Detail continues to be resolved well throughout the sensitivity range, and even at those incredibly high figures, like ISO 12,800 or 25,600, we can still see a reasonable amount of detail. Even the monochrome-only setting of Hi1 is usable, with the grain arguably adding to the film-like feel of a black-and-white shot.

Looking at raw-format files, it's clear that a fair amount of noise reduction is applied to JPEG images in their default settings, but this gives you scope to apply exactly the kind of noise reduction you want to in post-processing, balancing out detail with the presence of noise.

Using the matrix metering system leaves you with well-exposed images in the majority of conditions, and it even copes well with some high-contrast scenes. On occasion, you may find dialling in some exposure compensation for dull landscapes helps to bring out detail, though.

The automatic white balance system copes very well with different lighting conditions, and is pretty much faultless in daylight or cloudy conditions. It errs ever so slightly on the warm side under artificial lighting, so it's recommended for accuracy that you switch to a more

> "The automatic white balance system copes very well with different lighting conditions"



Above The Hi1 ISO setting is accessible only in the JPEG Monochrome mode, but its results are atmospheric.

appropriate white balance setting, or create a custom setting.

Autofocusing is a breeze with the D7200. Thanks to the new AF system, the camera is capable of locking onto a moving subject, even in lower-light conditions. The 15 cross-type AF points are more sensitive in lower light, while the central point is the most sensitive of all if light levels drop even further.



Left You won't find a dedicated Wi-Fi button: its activated via the menu.

The camera's burst depth is now much improved when compared with its predecessor. Shooting with Fine JPEG selected allows you to capture around 50 shots before the buffer fills; this equates to around nine seconds of shooting time, giving you plenty of opportunity to catch the action. Raw-format shooting at 14-bit gives you roughly 2–3 seconds, or 4–5 seconds at 12-bit, if you need the higher-quality files.

VERDICT

Although the D7200 may not be a complete overhaul, Nikon has tweaked an already great camera to produce something that is even better than its predecessor.

The D7200 makes for a great all-rounder. It produces images that are very sharp and detailed, with a pleasing degree of saturation. While it would be nice to see an articulating, or perhaps even touch-sensitive, screen, as we have on the D5500, it's great to have a 100% viewfinder to use.

The Expeed 4 processor fixes the issue of burst depth, making it more useful than before if you're shooting quick-moving subjects. The handling of the camera also remains great, with a high-quality feel you might otherwise expect from something that sits at the top of Nikon's range, rather than in the middle.

Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★☆

Overall ★★★★★

WE SAY: A comprehensive feature set and great quality images make the D7200 the ideal camera for enthusiasts – or maybe even a back-up model for those who already own a full-frame Nikon.



> THE SPECS	
Sensor	24.3 MP full-frame format (35.9 x 24mm)
Focal length conversion	1x
Memory	2 x SD / SDHC / SDXC
Viewfinder	Optical pentaprism (approx 100% cover)
Video	Full HD (1,920 x 1,080) at 60p, 50p, 30p, 25p and 24p
ISO range	100–12,800; expandable to ISO 50–51,200 equivalent
Autofocus points	51 phase-detection points (15 cross-type); contrast detection in Live View and video modes
Max burst rate	6.5fps at full resolution
Screen	3.2-inch, 1,229k-dot tilting TFT
Shutter speeds	1/4,000 sec–30 sec plus Bulb and Time
Weight	750g (body only)
Dimensions	140 x 113 x 78mm
Power supply	Li-ion EN-EL15 (supplied)

Digital Camera GOLD AWARD

SLR Nikon D750 > £1,799 / $2,297 > www.nikon.com

Fab full-frame

Nikon's D750 has a new AF system and promises better noise control than the D810. **Angela Nicholson** gives it a test

The latest addition to Nikon's full-frame camera line-up, the D750 sits above the D610 and below the Nikon D810 in the SLR range, and is aimed at enthusiasts. At its heart is a newly designed 24.3-million-pixel CMOS sensor and an Expeed 4 processing engine. Unlike the 36MP D810, however, there's an anti-aliasing filter over the sensor.

This sensor and processor combination enables a native sensitivity range of ISO 100–12,800, with extension settings taking this to ISO 50–51,200. It's also possible to shoot at up to 6.5 frames per second. Some sports photographers may have been hoping for something a bit faster; perhaps 8fps or more.

Better news for action fans is that Nikon has given the D750 a new Multi-Cam 3500 II autofocus module, an updated version of the one in the D810. This has 51 points, 15 of which are the more sensitive cross-type and 11 that operate down to f/8, which is especially useful for photographers who want to use an extender with their telephoto lenses. As in the D810, the new Group Area AF mode is available to help when shooting subjects that are comparatively small and against a high-contrast or distracting background.

Exposure metering is handled by a 91,000-pixel RGB sensor. There's also a useful highlight metering option, calibrated to take greater note of the brightest part of the scene to prevent it from being burned out.

Enthusiast videographers will appreciate the Full HD video recording at up to 60p, microphone port, headphone port, audio level fine-tuning, Spot White Balance mode, Flat Picture Control mode, and Zebra patterns to indicate which areas are in danger of burning out. The D750 can also output uncompressed footage via an HDMI connection to allow high-quality recording to an external device.



Above A tilting screen on a full-frame SLR – about time too.

BUILD AND HANDLING

Nikon has used a monocoque construction for the D750. A combination of magnesium alloy and carbon fibre means it has a good solid feel without excessive weight. It's reassuring to know that the camera has the same degree of weatherproofing as the D810. Inside there's a Kevlar/carbon fibre composite shutter, which has been tested to 150,000 cycles.

The D750 looks similar to the D610. However, the mode dial on



Stick or twist? Upgrade advice

The D750 introduces a new line for Nikon; consequently there's no direct upgrade path. However, it sits above the D610 (left) in the Nikon SLR range, so photographers looking for a full-frame camera will compare the two. The D750 has more AF points (51 vs 39), a higher-resolution screen mounted on a tilting bracket, Wi-Fi connectivity and a greater sensitivity range, making it a more versatile camera. However, this expanded feature set adds around £470 / $500 to the cost.

Zooming in on the... Nikon D750

Take the layout of the D610 and subtly enhance it



The centre lock button needs to be pressed before the mode dial can be rotated. It would be better to have an on/off-type lock.



The Pv and Fn buttons can be set to act as aperture adjusters for silent adjustments when shooting video.





Mounting the 3.2-inch 1,229k-dot screen on a tilting bracket makes composing video and landscape format stills at high or low angles more comfortable.



The Info button has been relocated in comparison with the D610.

There are twin SD/SDHC/SDXC card ports. One can act as an overflow or a back-up, or raw files can be saved to card 1 and JPEGs to card 2.



The Live View control is lower down in comparison with the D610, in the space created by moving the Info button.



the top-plate has the addition of Effects for accessing the Special Effects modes. A couple of controls on the D610 are also in a different position on the D750 and there's an 'i' button. When this is pressed, a list (rather than the usual grid) of features appears. There are a couple of customisation options (for example Assign Fn button) in this list, and we don't understand why these are in a quick access menu instead of being restricted to the main menu. And surely the 'i' and Info buttons' functions could also be combined into a single control?

> "The viewfinder isn't the brightest available, but it's still very good and covers 100%"

The D750 interface has changed a little in comparison with the D610's. When the White Balance button is pressed, for example, the screen shows more clearly which control is used to switch between preset values, and which adjusts the selected value to make images warmer or cooler.

Although the main menu looks at first glance like a close match for those on other Nikon SLRs, a second look reveals that the video options now have their own tab in the menu structure. This is a good move that will help you find the options you want more quickly.

As the D750 is an SLR, there's also an optical viewfinder for composing. This isn't the brightest available, but it's still very good and it covers 100% of the field of view, so there shouldn't be any surprises around the frame edges. If time and subject permits, however, we recommend using Live View when focusing manually.

Meet the rivals...

The cameras taking on the Nikon D750



Canon EOS 6D
Price: £1,299 / $1,899
An excellent 20.2MP full-frame SLR, but there's no flash and the viewfinder only covers 97%.
Reviewed: page 60



Nikon D610
Price: £1,330 / $1,799
A 24.3MP full-frame SLR with excellent build and image quality, but a fixed screen and no Wi-Fi.
Reviewed: issue 147



Sony Alpha 99
Price: £1,799 / $1,998
This 24.3MP SLT has a vari-angle screen, but the AF system is slow in comparison with others.
Reviewed: issue 136

CAMERA SHOPPER

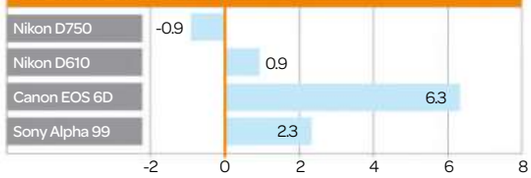
A DIGITAL CAMERA SPECIAL

WHAT'S THIS? Find out how we test on page 6

CAMERA BENCHMARKS

How does the Nikon D750 measure up?

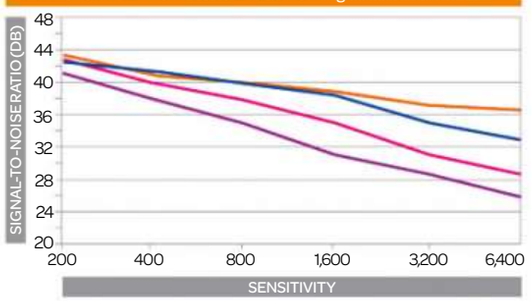
COLOUR ERROR Scores closer to zero are better



COLOUR ERROR RESULT: The D750 is on a par with the D610 for colour error, producing very accurate hues and natural saturation.

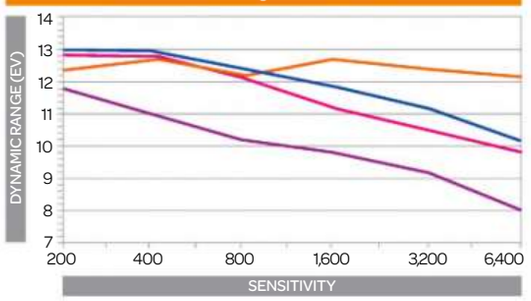
KEY: Nikon D750, Nikon D610, Canon EOS 6D, Sony Alpha 99

RAW SIGNAL-TO-NOISE RATIO* Higher scores are better



NOISE RESULT: While it lags behind at higher sensitivity settings, the D750 leads at ISO 100 values, indicating lots of detail and little noise.

RAW DYNAMIC RANGE* Higher scores are better

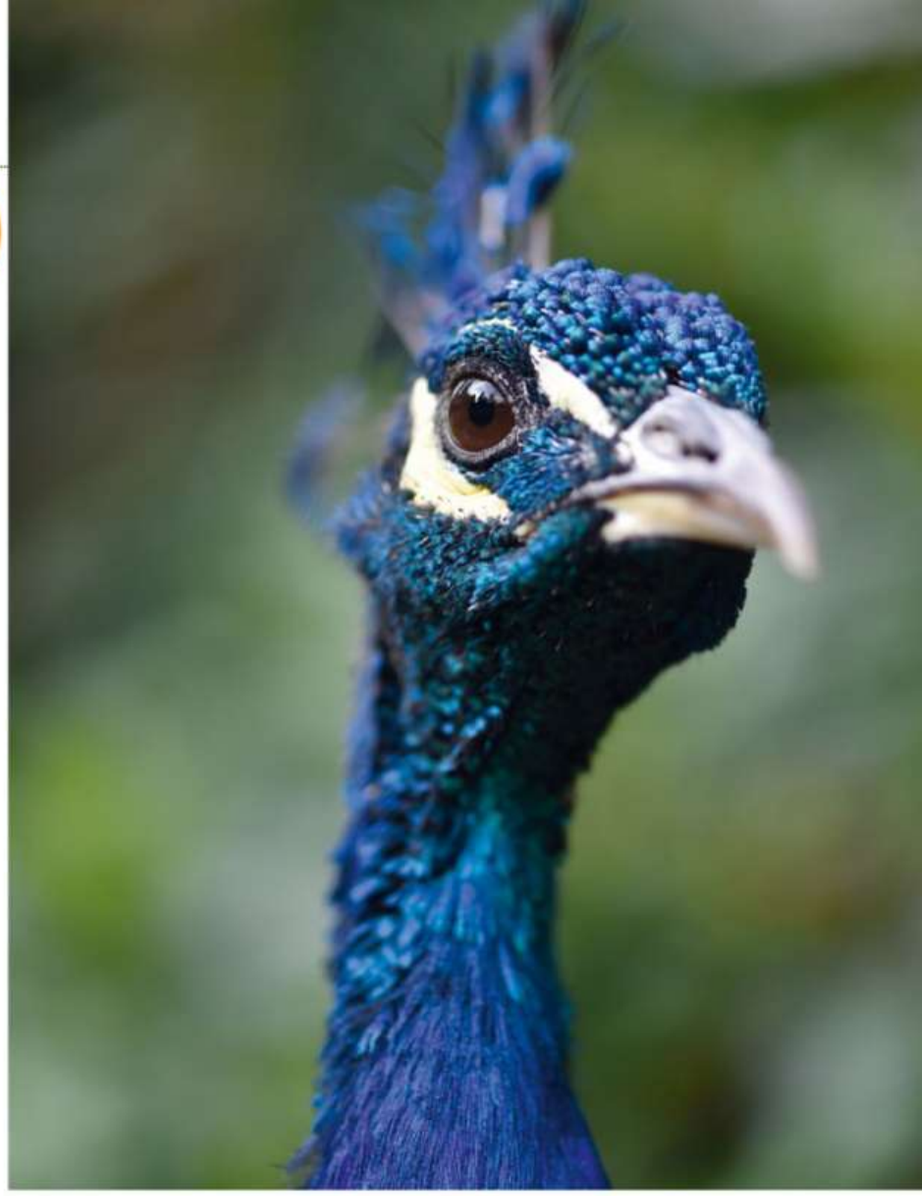


DYNAMIC RESULT: Though the D750 doesn't have the highest scores, it doesn't suffer from a low range in real-world images.

OVERALL BENCHMARK RESULT

Although the D750 doesn't score especially well against the competing cameras for noise control and dynamic range in the lab, it is more than a match for detail resolution and performs especially well at ISO 100. This emphasis on resolution may explain the other slightly lower results.

* Raw results use images converted to TIFF



Above Bright colours are usually rendered well and with pleasant vibrance

PERFORMANCE

As the D750 has a 24-million-pixel sensor with an anti-aliasing filter, it isn't be able to match the D810 for detail, but it can record a little more than the D610. Our tests also reveal that the D750 controls noise well: even when the noise reduction is turned off in the processing of raw files shot at ISO 6,400, there is only a little coloured speckling visible at 100%. Step up to the native maximum of ISO 12,800 and chroma noise becomes more noticeable, but it is still controlled well, and the level of detail is impressive. Simultaneously captured JPEGs have no chroma noise, but there is luminance noise, and images look a little softer at 100%.

Although dynamic range and detail levels drop off at the expansion sensitivity settings, the results still look decent. Even images taken at the maximum sensitivity (ISO 51,200) can make acceptable A3 prints.

In some cases, the D610's screen makes images captured in shade look too cold, which could trick you into setting the wrong white balance. Thankfully, this isn't a problem with the D750, which has the same screen as the D810.

The D750's automatic white balance system also does a very good job in most conditions. The second Auto setting, which is specifically intended to retain the warm notes of warm lighting, is useful on occasion. However, if you really want the warm glow of evening sun to be recorded, the Daylight option is your best bet. Occasionally, there is a colour shift in a sequence of images when using the Automatic White Balance settings. It seems likely that the automatic scene recognition system aspect of the processing is responsible.

We have yet to come across an infallible metering system, but the D750's Matrix-metering system is very good. During our testing it managed to deliver perfectly exposed results, even when shooting bright subjects like backlit leaves. Exposure compensation was required on a few occasions, but never when you wouldn't expect – and it wasn't needed on a few occasions when we might have expected it to be.

Nikon has given the D750 an updated version of the AF system from the D810. It performs superbly with a decent lens, gets subjects sharp incredibly quickly and is capable of tracking the subject around the frame when the appropriate mode is selected. The fact that it's sensitive down to -3EV means that it's also useful in low-light conditions. In many situations it still manages to latch onto subjects quickly.

Nikon introduced the new Clarity control to the Picture Control options





Above The AF system coped well with this low-contrast subject swaying in the breeze.

Left The D750's top plate is almost identical to the one on the D610.

in the D810, and it's present on the D750. It's useful for giving images extra bite. The beauty of the Picture Controls is that they can be used when shooting raw and JPEG files simultaneously, so you have a full colour file as well as a treated JPEG.

Conversely, rotating the mode dial to the Special Effects option results in only JPEG images being recorded. These Effects can be previewed in Live View mode. In many cases previewing an Effect is enough to convince you not to use it.

By including Wi-Fi connectivity in the D750, Nikon has gone a step further than Canon with its 7D Mark II for those wanting to control the camera remotely. However, Nikon's free Wireless Mobile Utility app only offers limited control over the camera. It's in effect just a wireless remote.

VERDICT

The D750 is a great camera. Its Matrix-metering system is very capable, delivering correct exposure in a wide range of situations, and it produces images that have natural yet vibrant colours. It may not offer the class-leading detail resolution of the D810, but it's more than a match for the D610 in this respect. The D750 captures an impressive level of sharp detail, and noise is controlled well.

One of the D750's biggest selling points, however, is its AF system. There's an array of AF modes offering pro-level control and customisation.

It's a shame, though, that Nikon hasn't taken the opportunity to correct some of the handling oddities of the past and make features like the Special Effects and HDR mode more attractive to enthusiasts.

Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★☆

Overall ★★★★★

WE SAY: Although we have a few niggles with the D750, it is an excellent camera. It has a professional-level AF system, and is capable of producing superb images even in tricky conditions.



CSC Olympus OM-D E-M10 > £399 / $499 (body only) > www.olympus.co.uk

Best of three

Olympus's third OM-D, the E-M10, has many features of the original in a smaller body. **Angela Nicholson** takes a look...

> THE SPECS

Sensor	16.1MP Micro Four Thirds format (17.3x13mm)
Focal length conversion	2x
Memory	SD/SDHC/SDXC
Viewfinder	Electronic viewfinder with 1,440,000 dots (approx 100% cover)
Video resolution	1080p
ISO range	100-25,600
Autofocus points	81
Max burst rate	8fps (AF and exposure locked at start)
Screen	Tilting three-inch, 1,037,000-dot touchscreen
Shutter speeds	1/4,000-60 sec plus Bulb
Weight	350g (body only)
Dimensions	119.1x82.3x45.9mm
Power supply	BLS-5 rechargeable lithium-ion battery (supplied)

The OM-D E-M10 is the third model in Olympus's highly respected OM-D series of Micro Four Thirds compact system cameras. It now sits beneath the OM-D E-M5 (the original OM-D) and the OM-D E-M1 as the entry-level option.

Despite its starter status, however, it has many high-end features from the E-M5, as well as a few from the top-end E-M1. The Four Thirds type (17.3x13mm) 16.1-million-pixel LiveMOS sensor and 1,440,000-dot electronic viewfinder, for example, are also found in the E-M5.

FEATURES

Olympus has coupled the E-M10's sensor with the same TruePic VII processing engine that's found in the E-M1. This combination allows a shutter speed range of 1/4,000-60 sec (plus Bulb and Time shooting), a sensitivity range between ISO 100 and ISO 25,600 and an exposure compensation range of +/-5EV. The E-M10 can shoot continuously at up to eight frames per second, although focus and exposure are locked at the start of the sequence.

Because the E-M10 uses the same sensor as the E-M5, it doesn't have the phase-detection pixels of the E-M1, so focussing is carried out by contrast-detection alone. There are 81 AF points available, which can be selected individually or in groups of nine. In addition to Single AF mode, you can choose between Continuous AF, Manual Focus (MF), Single AF + MF and AF Tracking. Manual focus is aided by the ability to magnify specific areas of the scene and by focus peaking, which highlights the areas of highest contrast. Face Detection AF is also available and can be augmented with Eye Detect AF, Left, Right and Near side priority.

Although the E-M10 is the most affordable camera in the current OM-D range, it still has plenty of advanced features to offer enthusiast photographers. There's full control over exposure when you want it, as well as the Aperture Priority and Shutter Priority modes you'd expect. Images may also be shot in raw or JPEG format — or both together, which is useful when using one of the 19 Art Filter modes, as you can have a JPEG image with the effect applied alongside a 'clean' raw-format file for post-processing.

Olympus has also included Wi-Fi connectivity, and the camera can be controlled remotely via a smartphone or tablet using the Olympus Image Share app. Available for both iOS and Android, the Image Share app affords control over all the key exposure settings. It's even possible to remotely change exposure mode from the setting on the mode dial.

Above Olympus hopes the new OM-D E-M10 will find favour in the same way as the OM-10 did when it was launched in 1979

The E-M10 has the same 1,440,000-dot electronic viewfinder as the E-M5, but adopts the E-M1's Adaptive Brightness Technology to vary the finder brightness in response to ambient lighting.

BUILD AND HANDLING

Although it's smaller than either of the earlier OM-D cameras and doesn't have their dust- and splash-proof build, the E-M10 has a metal body and it feels sturdy in the hand. Owning a small camera can sometimes mean that the controls are cramped together or they're awkward to hold, but the E-M10 is exceptionally comfortable. It feels secure in your grasp, thanks to its



Unlike the other OM-Ds, the E-M10 features a small pop-up flash



It's easy to connect to the Wi-Fi system and the Image Share app



No weatherproofing means you need to take care in wet conditions



A tilting screen isn't as useful as one on a fully articulating hinge

FEELING TREATED

FEELING CHEATED

Zooming in on the... Olympus E-M10

A quick tour of the camera's key features



Although there's an Art Filters mode, effects can be applied in the other exposure modes to retain control over the settings

These two dials are within easy reach and allow exposure settings to be adjusted quickly



Quick access to Highlights and Shadows, Color Creator, sensitivity, and other options





There's a sensor to detect when the EVF is held to your eye, but you can easily activate and deactivate it here



front grip and strategically placed thumb pad. The controls are nicely spaced and within easy reach, using the same layout as the E-M5.

The E-M10 combines an extensive array of buttons and dials with touchscreen control. The Super Control Panel can be operated via the screen, and you can set the AF point and trip the shutter with a tap on the monitor. While the tilting screen provides a clear view in many conditions, including quite bright light, it feels more natural to use the viewfinder in many situations. This also provides a detailed view, with a slight increase in micro contrast to remind you that it's an electronic rather than an optical finder.

> "Connecting the E-M10 to a smartphone or tablet using the built-in Wi-Fi system is easy"

Connecting the E-M10 to a smartphone or tablet using the built-in Wi-Fi system is easy via the free Olympus Image Share app. Although there's no NFC (Near Field Communication) chip, initial set-up is simple: the camera's screen displays a QR code, which the phone scans to obtain the necessary data. After this is done once, you just touch Wi-Fi on the camera's screen and wait a couple of seconds to activate the system. Now you can start the smartphone app and select your preferred option: Remote Control, Import Photos, Edit Photo or Add Geotag.

The camera responds quickly to setting adjustments made via the phone, and the system provides a convenient method of controlling the camera when shooting from awkward angles or tight spots. The only downside is that the digital level isn't displayed on the phone screen, so you can't be sure the horizon will be level.

It's useful to control the camera remotely via the app when shooting in Live Bulb or Live Time mode, as it avoids introducing blur when you touch the camera.

PERFORMANCE

Because the E-M10 has the same sensor as the E-M5 and the same processing engine as the E-M1, we had high expectations for its image quality. These expectations have not been disappointed: the camera is

Meet the rivals...

See how the E-M10 stands up against the competition



Fujifilm X-E2
Price: £499 / $799 (body)
An excellent CSC, with traditional controls and high build quality to match its superb images.
Reviewed: issue 150

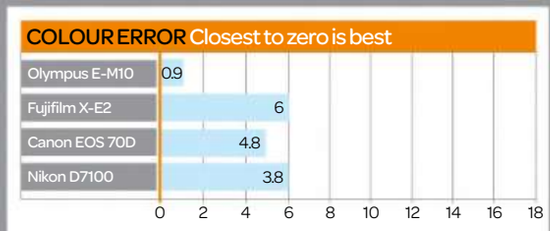


Canon EOS 70D
Price: £734 / $999 (body)
A high-quality SLR, with a responsive touchscreen display and wireless connectivity built-in.
Reviewed: issue 144

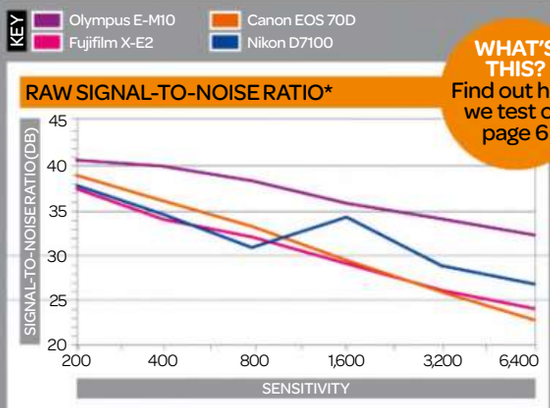


Nikon D7100
Price: £748 / $897 (body)
Produces sharp images, but noise appears on the scene quite early on in the sensitivity range.
Reviewed: issue 138

SLR BENCHMARKS
How the Olympus E-M10 fared against others

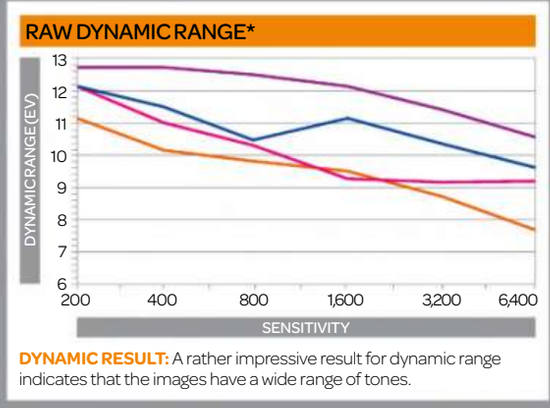


COLOUR ERROR RESULT: Our tests show that the E-M10 maintains colour accuracy very well, beating all of its test rivals.



WHAT'S THIS? Find out how we test on page 6

NOISE RESULT: The E-M10 compares favourably with the others here, although at the expense of resolution at the highest ISO values.



DYNAMIC RESULT: A rather impressive result for dynamic range indicates that the images have a wide range of tones.

OVERALL BENCHMARK RESULT

Our tests show that the E-M10 has a great dynamic range. While our real-world images confirm this, it comes coupled with a slightly flatter look to JPEGs than the Fujifilm X-E2 produces, when using the default Natural picture mode.

* Raw results use images converted to TIFF



Above The tilting screen is useful when shooting very low

capable of producing superb images with plenty of detail.

Noise is controlled well in JPEGs taken at up to around ISO 6,400, at which point some smoothing and slight loss of detail is evident in images viewed at 100% on screen. As usual, this softening increases with sensitivity; while the top value of ISO 25,600 produces respectable results, many photographers are likely to keep it for emergencies only.

Luminance noise is visible from around ISO 1,600 when viewing an image at 100%, but it only starts to become noticeable at normal viewing sizes at about ISO 6,400. Chroma noise (coloured speckling) isn't an issue in high-sensitivity JPEG shots, even in the darker areas.

Olympus's general-purpose ESP metering system performs well in a range of situations, and delivers good exposures. Naturally, it's not completely foolproof, and the exposure-compensation facility can come in handy on occasion. During our tests, it was usually to decrease the exposure a little in high-contrast conditions. Reducing the exposure of a bright landscape by -1/3EV can also play dividends in colour saturation.

On the subject of colour, the E-M10 generally produces natural-looking hues in its Natural Picture mode, and the automatic white balance system copes admirably with most natural lighting conditions. As is often the case, however, it struggles a little under artificial light, when a bespoke setting via the manual white balance control is the best option.

As the E-M10 has an anti-aliasing (AKA optical low-pass) filter, we thought that it may not be able to resolve quite as much sharp detail as the E-M1 – but judging by our resolution chart images, it can. In fact, it can resolve a little bit more than the E-M1 and the E-M5 at some low and mid-range sensitivity settings, although there's not a lot in it. Its resolution score drops off at the higher end of the sensitivity scale, however, probably because of the noise control system. There is still a good impression of detail visible at normal viewing sizes.

In normal daylight conditions, the E-M10's autofocus system is fast and accurate. It's even able to keep up with quite fast-moving subjects, and in AF Tracking mode it can keep it sharp as it moves around the frame. Flushed with confidence at this success, we



took the OM-D E-M10 to a funfair at night to see how it would deal with erratically moving subjects under low-light conditions. Sadly, it proved too much for the camera's contrast-detection AF system: although it was able to cope with stationary subjects, the system wasn't quick enough to lock onto fast-moving subjects in the low artificial light. We did manage to get a few sharp shots of a mini rollercoaster. In continuous AF mode, provided we kept the active AF point over the moving subject, the camera was able to get it sharp and stayed with it as it moved towards the camera.

Above This image took 5.5 seconds at ISO 100 and f/18

Below The E-M10 is constructed from metal, so feels solid



VERDICT

Given that it has much in common with Olympus's other OM-D cameras, we expected the E-M10 to produce high-quality images. It's a little surprising that the camera resolves quite so much detail, though, especially considering that its sensor has an anti-aliasing filter. Our lab results show that the E-M10 fares well against popular SLRs such as the Canon 70D and Nikon D7100, but it's clear that the AF system needs some work if the camera is going to compete fully with an SLR.

All things considered, we think the Olympus OM-D E-M10 is a great little camera. It has lots of useful features in a small body, and delivers high-quality images.

Tech briefing
Live modes



Most cameras have a Bulb mode in which the shutter stays open for as long as the shutter release is held down. It's especially useful for making long exposures when using a remote release.

Olympus has built on this with its Live Bulb, Live Time and Live Composite modes, in which the image is seen to develop on the camera's screen. It means that rather than calculating or guessing the exposure time, the photographer can see when the image looks right and close the shutter.

In Live Bulb mode, the shutter stays open for as long as the shutter release is triggered; in Live Time mode, one press opens the shutter while a second closes it. In Live Composite mode, meanwhile, a sequence of exposures are all combined into one with every press of the shutter release.

Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★★	★★★★☆

Overall ★★★★★

WE SAY: Small and light enough to use as a carry-round camera, the OM-D E-M10 affords lots of control, feels good in the hand, has a great control layout and produces superb images.

> THE SPECS	
Sensor	16.1MP Micro Four Thirds format (17.3 x 13mm)
Focal length conversion	2.0x
Memory	SD / SDHC / SDXC
Viewfinder	Electronic viewfinder (EVF) with 2,360,000 dots (approx 100% cover)
Max Video Resolution	1080
ISO range	100–25,600
Autofocus points	81
Max Burst Rate	10fps (AF, white balance and exposure locked at start)
Screen	Vari-angle three-inch, 1,037,000-dot touchscreen
Shutter speeds	Mechanical shutter, 1/8,000-60 sec plus Bulb; electronic shutter, 1/1,6000-60 sec
Weight	417g (body only)
Dimensions	124 x 85 x 38mm
Power supply	BLN-1 rechargeable lithium ion battery (supplied)



Digital Camera EDITOR'S CHOICE

CSC Olympus OM-D E-M5 Mark II > Body: £869 / $1,050 > www.olympus.com

The big picture

Olympus' 16MP E-M5 Mark II can produce 40MP or even 64MP images automatically. **Angela Nicholson** finds out how

The Olympus OM-D E-M5 was the first camera in Olympus's OM-D line of Micro Four Thirds compact system cameras, and is sometimes referred to as the original OM-D. Its electronic viewfinder and SLR-like design distinguished it from the Olympus Pen series. It was also aimed at more experienced photographers than the Pen or Pen Lite.

As the name suggests, the OM-D E-M5 Mark II is the replacement for the original E-M5. It sits between the top-end E-M1 and the lower-level E-M10 in the OM-D range.

FEATURES

The E-M5 II uses a modified version of the 16.1MP Four Thirds type (17.3 x 13mm) sensor in the original E-M5, but it's coupled with the TruePic VII processing engine of the E-M1. A more significant upgrade, however, is the Mark II's ability to create 40MP JPEG or 64MP raw files automatically in its High Res Shot mode. Using the upgraded Image Stabilizer, it shifts the sensor by a tiny amount between shots as it takes a sequence of eight images. The camera then combines these images into a large composite. As the capture process takes around a second, High Res Shot mode is a tripod-only feature that's designed for motionless subjects.

Olympus has also improved the sensor-shifting five-axis image stabilisation system for the E-M5 Mark II. It claims a 5EV extension in the safe hand-holdable shutter speed; that's the difference between 1/500 sec and 1/15 sec. Significantly, it also works in video mode.

Live Bulb and Live Time mode are both present, along with the Live Composite mode introduced with the E-M10. These allow you to see long-exposure images building up on the camera's screen, or on a smartphone or tablet connected via the camera's Wi-Fi system. Live Composite mode is intended for shooting fireworks and star trails or painting with light.

With the possible exception of the lack of a pop-up flash, the E-M5 Mark II has a comprehensive specification that provides the enthusiast photographer with just about everything they could want.

Below The fingergrip is slim but effective.





Stick or twist? Upgrade advice

While it uses essentially the same 16MP sensor as the original OM-D E-M5 (pictured), the Mark II adds the ingenious ability to create much larger files. The screen has also been upgraded from a tilting 610,000-dot unit to a 1,037,000-dot vari-angle device (although it's an LCD rather than an OLED screen), while the electronic viewfinder has been boosted to 2,360,000 dots. In addition, Olympus has given the new camera an 81-point AF system, although it's not the hybrid AF system of the E-M1.

Zooming in on the...
OM-D E-M5 Mark II

There are a couple of telling changes from the original E-M5



A couple of photographers accidentally pressed this button on the front when holding the camera to their eye.



The mode dial has a lock to prevent you from changing modes by accident.





The Mark II has a couple of extra buttons on the top-plate and a rejig to the adjustment dial arrangement.



In a change from the original E-M5 layout, the power switch is now alongside the mode dial.

The new vari-angle 3-inch 1,037k-dot touch-sensitive screen is useful for composing images at awkward angles in landscape or portrait format.



The electronic viewfinder (EVF), which shows 100% of the scene, has been improved and has 2,360,000 dots rather than the 1,440,000 dots of the original E-M5's.

It also has plenty to entice aspiring videographers, such as frame rates up to 60fps, bit rates up to 77Mbps, Time Code and a 3.5mm mic port.

BUILD AND HANDLING

It may be small, but the OM-D E-M5 Mark II feels nicely constructed. Its magnesium body is solid, comfortable and secure in the hand. It's also dust- and water-proof, as well as freeze-proof down to -10 degrees C.

The E-M5 II sits between the E-M1 and E-M10 in the OM-D range, and its control arrangement is halfway between the two. Taking a cue from the E-M1, there's a switch on the back that changes the options adjusted by the two top-plate dials. This switch is a mixed blessing. On one hand, it doubles the number of options that can be adjusted via the dials, but on the other, you need to remember which setting gives access to the controls you want. You get into the swing of it once you've been using the camera for a while, but you can expect some frustration in the early days.

One of the great features of the OM-D series is that the cameras are extremely customisable. However, it can take quite a while to find and understand all the options as well as the huge range of features. The controls are all within easy reach, but some people may find the small buttons fiddly. I also found that a couple of buttons didn't behave as I would expect on a few occasions. The Info button, for example, which I used to toggle between the

Meet the rivals...

The cameras taking on the E-M5 Mk II



Fujifilm X-T1
Body: £869 / $1,050
Traditional controls and retro styling, plus superb-quality images make this SLR-like 16MP compact system camera a real winner.
Reviewed: page 16

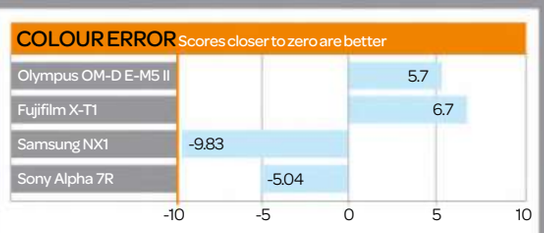


Samsung NX1
Body: £1,249 / $1,499
With 28MP, this is the highest-resolution APS-C format camera around. Image quality is high and although it's a CSC, the AF system is excellent.
Reviewed: issue 160



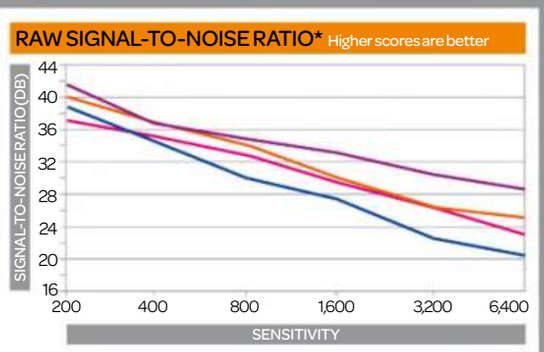
Sony Alpha 7R
Body: £1,339 / $1,898
A full-frame 36MP sensor inside a compact body, with bags of control and superb build quality. The image quality doesn't disappoint either.
Reviewed: issue 147

CAMERA BENCHMARKS
How does the E-M5 Mk II fare?

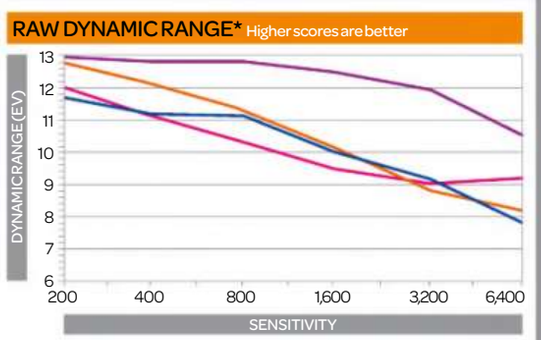


COLOUR ERROR RESULT: Some hues are a little over-saturated, but on the whole, the E-M5 Mark II produces very pleasing colours.

KEY: Olympus OM-D E-M5 II; Fujifilm X-T1; Samsung NX1; Sony Alpha 7R



NOISE RESULT: In its standard 16MP mode, the E-M5 II beats its rivals at most ISO settings, indicating that images are a little cleaner.



DYNAMIC RESULT: The E-M5 II performs consistently throughout its sensitivity range. This indicates that raw files have a wide tonal range.

OVERALL BENCHMARK RESULT
Overall the OM-D E-M5 II puts in a good performance in our lab. While it can't match the Samsung and Sony cameras and their larger, higher-pixel-count sensors for detail resolution in its standard 16MP mode, it produces very respectable results for a Micro Four Thirds camera – and can match them in High Res Shot mode.

* Raw results use images converted to TIFF



on-screen displays, occasionally wouldn't bring up the electronic level display. And there was a short period when I couldn't review images in the viewfinder. I was unable to find any explanation for this within the menu, and the ability to review recovered without me changing any settings.

Above It was very useful to be able to check the focus was spot-on using the magnified view in the rear display.

The electronic viewfinder provides a good view of the subject. There's no sign of any texture or flickering, and the contrast is a good match for the scene's. With the Natural Picture mode selected, the viewfinder image sometimes looks a little more saturated than the scene, but the hues are a good match. There's some noise visible in very low light, but you can still see the subject clearly.

PERFORMANCE
One of the main attractions of the OM-D E-M5 Mark II is its High Res Mode, which enables it to record 40MP JPEG images or 64MP raw files. As you might imagine, this isn't without compromise. Sensitivity is limited to ISO 100-1,600, the minimum aperture is f/8 and the slowest available shutter speed is eight seconds.

It's also essential that the camera is stationary and that the subject doesn't move. Even small movements result in a hatched pattern appearing or ghosting in images. The High Res Shot raw files also have to be processed using a free Photoshop plug-in for Windows or Mac OS X.

Olympus prefers to refer to the camera as a 40MP model, because the engineers believe that the 64MP raw files only resolve a level of detail equivalent to that from a 40MP camera. Of course it depends upon what format that camera is: let's not forget that the Four Thirds-type sensor inside the OM-D series cameras is smaller than



Below This is the first Olympus CSC to have a vari-angle screen.

"It may be small, but the OM-D E-M5 Mark II feels nicely constructed. Its magnesium body is solid and comfortable"



Above Despite being hand-held and taken at 1/6 sec to blur the man's movement, the surrounding walls are perfectly sharp.

both APS-C and full-frame format. However, our tests show that at the lowest sensitivity settings the E-M5 Mark II can match the full-frame 36MP Nikon D810 for resolving power. It drops away from the D810 a little as sensitivity rises, but as the camera has to be tripod-mounted and the subject motionless, there will be few occasions when sensitivity needs to be raised above ISO 200.

The results are very impressive. Comparing simultaneously captured high-resolution files at 100% reveals that the JPEGs look slightly sharper and more natural, which seems to bear out Olympus's decision to limit their size at 40MP.

Turning to the standard (16MP) files, noise is controlled well from ISO 100-6,400, although some luminance noise is visible at 100% in images taken at the lowest sensitivities. Unusually, JPEG files taken in the standard settings look very similar to raw files processed in the supplied Olympus Viewer software with all noise reduction turned off. Even at the highest sensitivity setting, there's little chroma noise (coloured speckling) visible, but luminance noise is present at every value.

The results at ISO 6,400 are good, but stepping up to ISO 12,800 and ISO 25,600 increases the level of smudging in images viewed at 100% and colour saturation drops. These images also look a little softer than ISO 200 shots when sized to make A3 prints, but are still passable.

Below Seals around the controls keep out moisture and dust effectively.



The E-M5 II's automatic white balance system does a very good job in most natural lighting situations. It also doesn't fare badly in some artificial lighting situations, adding a hint of colour that gives away the light source. Colours are also handled well in the Natural Picture mode, but there's a collection of other options, such as Vivid, Muted, Portrait and Monotone, as well as the Custom and Color Creator options, if you're looking for a different treatment to be applied to the JPEG files.

Although it doesn't have the hybrid AF system of the Olympus OM-D E-M1, the E-M5 Mark II's 81-point AF system is very good. In normal daylight conditions, it gets subjects sharp quickly; and while it struggled more than the Canon 5D Mark III, I was able to get some sharp images in poor light using the M Zuiko Digital ED 40–150mm f/2.8 Pro lens. When shooting with the M Zuiko Digital 12-50mm f/3.5–6.3 EZ ED MSC kit lens at 14–17mm, which equates to 28–34mm in full-frame terms, I got consistently sharp results that stand scrutiny at 100% at 1/6 sec. Most shots I took at 1/5 sec are also sharp at 100%.

VERDICT

Although the occasions in which the system can be used are limited, the E-M5 Mark II's ability to shoot 40MP and 64MP files is very attractive. This and the vari-angle screen could attract new users to the OM-D series, as well as entice existing E-M5 users.

The E-M5 Mark II has an large feature set, and it can take a while to discover important controls and get familiar with the layout. While experience helps, the interface would benefit from a rethink to group more of the connected features or controls together. It is an excellent camera, but these limitations stop the E-M5 Mark II from getting a perfect score.

Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★★	★★★★★

Overall ★★★★☆

WE SAY: This is a capable camera that offers extensive control. However, its complexity should not be underestimated. The new High Res Shot mode is especially impressive, despite its limitations.

> THE SPECS	
Sensor	16MP Four Thirds Live MOS sensor (17 x 13mm)
Focal length conversion	2x
Memory	SD / SDHC / SDXC
Viewfinder	None
Video	Full HD (1,920 x 1,080)
ISO range	200–25,600 (expandable to ISO 100)
Autofocus points	23
Max burst rate	5.8fps
Screen	Tilting 1,040k-dot TFT LCD.
Shutter speeds	1/16,000–60 sec
Weight	266g (including battery and memory card)
Dimensions	107 x 65 x 33mm
Power supply	Li-ion battery pack (rechargeable, included)



CSC Panasonic GF7 > With 12-32mm f/3.5-5.6 kit lens: £389 / $460 > www.panasonic.com

Selfie snapper

The GF7, Panasonic's latest starter CSC, offers a host of enticing features in a smaller, more retro body, says **Amy Davies**

Panasonic's GF series was traditionally its range aimed at novice photographers – but since the introduction of the GM series, it has taken a little bit of a back seat. The most recent addition to the GF line, the GF7, puts some life back in the older dog.

FEATURES

At 16 million, the pixel count of the GF7 remains the same as the GF6, but the sensor and processor are upgraded to those from the Panasonic GX7.

There's also a screen that can be flipped upwards through 180 degrees to help when taking selfies. The camera can automatically switch to selfie mode when the screen is flipped up. New options such as Face Shutter, Buddy Shutter and Jump Snap mode have also been included to help when taking shots of yourself.

BUILD AND HANDLING

Despite the fact that it's smaller than the GF6, the GF7's redesigned body feels a little more solid. For example, there's a more substantial thumb-pad on the back of the camera. Although the ridge texture on the front of the GF6 is now missing, the coating on the GF7 still gives some purchase.

Semi-automatic modes (such as Aperture Priority) are included on the mode dial, along with Panoramic mode, Scene mode, digital filters and a couple of specific scene modes. The Automatic mode, however, is available via a separate dedicated button.



Above A good range of lenses is available from Panasonic, Olympus and other manufacturers.

While there is now only one customisable physical button – which accesses Wi-Fi settings by default – there are a further six 'virtual' spaces on the touchscreen, which can also be customised; they're useful if you find yourself wanting quick access to a given function.

PERFORMANCE

Colours are bright and punchy direct from the camera, but without so much vibrance that images appear unnatural.

Changing the Photo Style enables you to alter the look of your image. You can choose from options such as Vivid, for instance, which is useful for boosting the hues in landscape shots. The good news is that you can use these when shooting raw as well as JPEG images, so you also have an unprocessed version of the image should you need it. The same can be said of the more dramatic digital

Meet the rivals...

The cameras taking on the Panasonic GF7



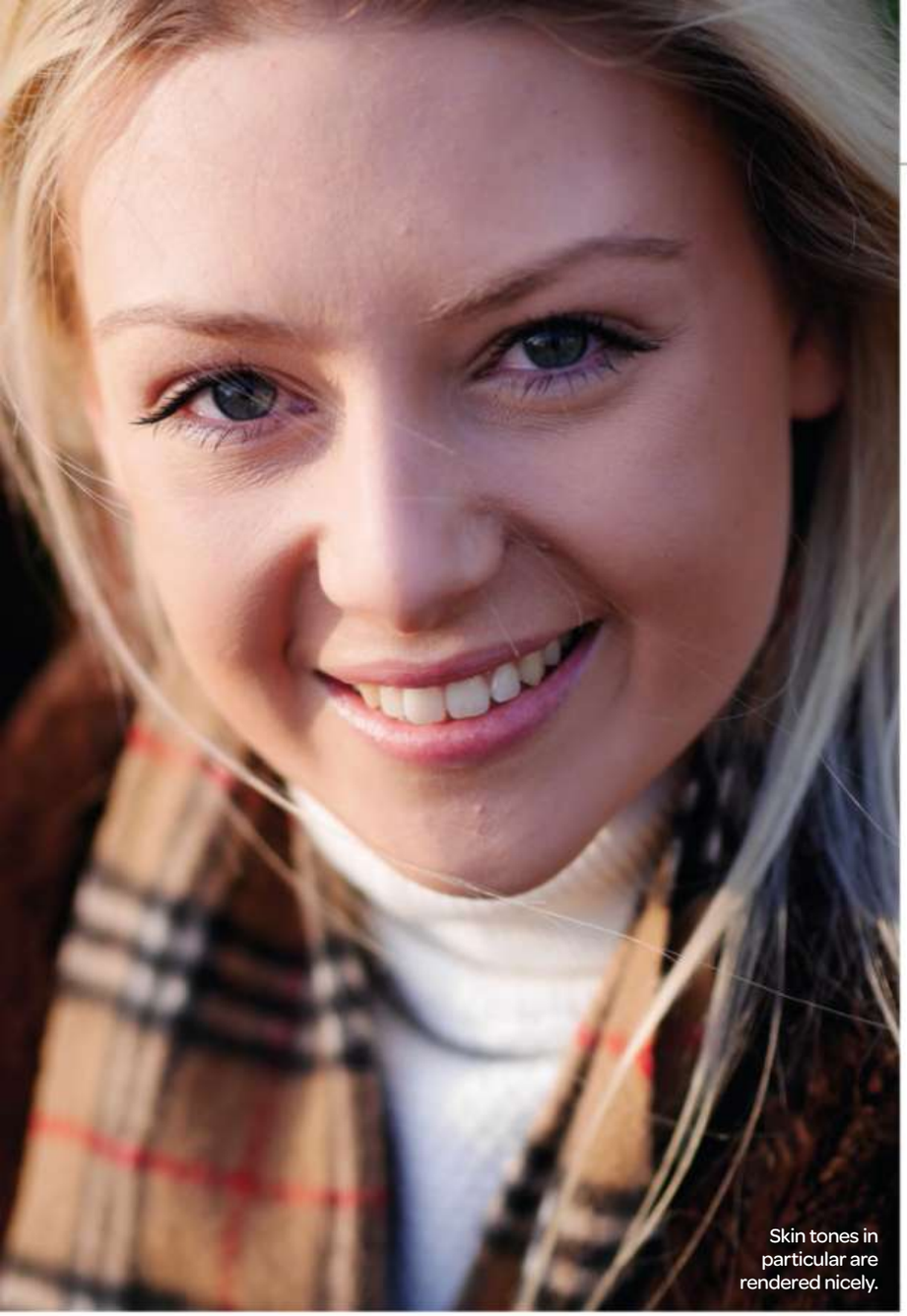
Sony A5100
With 16–50mm lens:
£449 / $598
A decent camera with good features. The Sony E Mount is also well-established.
Reviewed: page 118
★★★★☆



Panasonic GM5
With 12–32mm lens:
£449 / $797
A capable CSC with a Four Thirds sensor, Wi-Fi and a bright viewfinder.
Reviewed: issue 160
★★★★★



Nikon 1 J4
With 10–30mm lens:
£359 / $379
Not the most exciting camera in the world, but image quality is good.
Reviewed: issue 157
★★★★☆



Skin tones in particular are rendered nicely.

filters, which you can apply in semi-automatic or Manual modes to keep control of other camera settings.

The camera reproduces detail very well. As you move up the sensitivity scale towards higher values such as ISO 3,200, you can see some smoothing and loss of detail at 100%. The overall impression at normal printing sizes is very good, though.

Generally speaking, both the all-purpose metering system and the automatic white balance system do a good job of getting exposure and colour just right.

The supplied kit lens is a decent performer, but you may find it useful to purchase a longer focal length optic for holidays and travelling.

I found the GF7's autofocusing speeds very quick, especially in bright light, and it's only really when you reach almost pitch-black conditions that the camera starts to struggle to lock on at all.

VERDICT

Some may question the point of the GF series now that the GM series exists, but it still offers a great range of features at a more affordable price.

Great for travelling, the GF7's flipping screen is ideal for selfies and documenting your holiday visits, but the image sensor and processor can cope with varied conditions.

Digital Camera

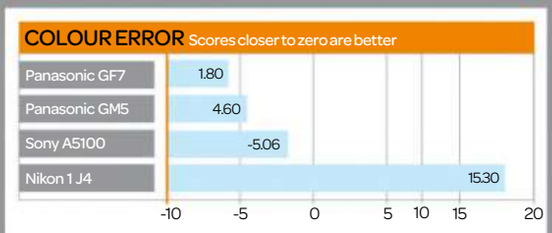
FEATURES	BUILD QUALITY
★★★★☆	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★★

Overall ★★★★★

WE SAY: It's easy to recommend this camera to photographers in many fields. Travelling photographers looking for something light and hassle-free will particularly enjoy it, though.

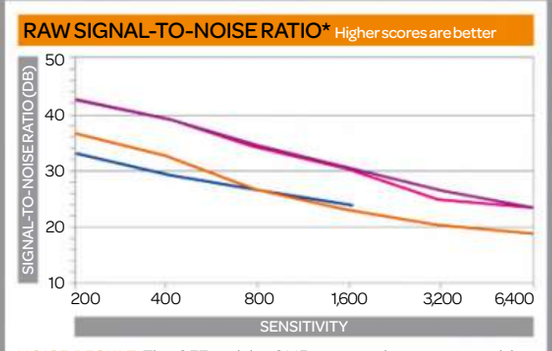
SLR BENCHMARKS

How does the GF7 measure up?

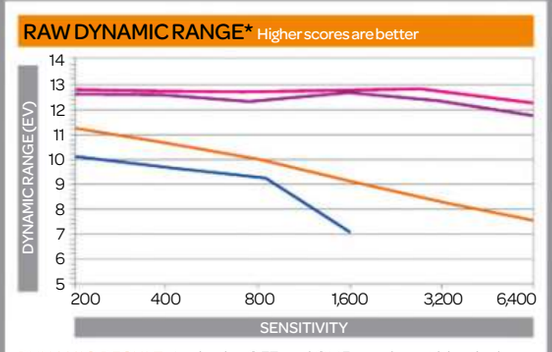


COLOUR ERROR RESULT: The GF7 is the most accurate camera in this test. Its real-world shots show vibrance that is not over the top.

KEY: Panasonic GF7, Panasonic GM5, Sony A5100, Nikon 1 J4



NOISE RESULT: The GF7 and the GM5 are very close – not surprising given they share the same sensor and processor.



DYNAMIC RESULT: Again, the GF7 and GM5 are almost identical, while both cameras easily beat the Sony A5100 and the Nikon J4.

OVERALL BENCHMARK RESULT

As we expected it to, the GF7 performs very well. The Sony A5100 has a APS-C sized sensor, compared with the GF7's Four Thirds, so it's interesting to note the better performance of the smaller sensor. The GF7 also performs well when looking at the JPEG images, and not just the raw files.

*** Raw results use images converted to TIFF**



Below The iA button is useful if you want the GF7 to take control.



CSC Panasonic Lumix DMC-G7 > with 14-42mm kit lens: £679/$798 > www.panasonic.com

Special 4K

Panasonic's latest SLR-styled CSC promises to make 4K shooting useful to creative stills and movie shooters



> THE SPECS	
Sensor	16MP Four Thirds Live MOS sensor (17 x 13mm)
Focal length conversion	2x
Memory	SD / SDHC / SDXC
Viewfinder	None
Video	Full HD (1,920 x 1,080)
ISO range	200–25,600 (expandable to ISO 100)
Autofocus points	23
Max burst rate	5.8fps
Screen	Tilting 1,040k-dot TFT LCD.
Shutter speeds	1/16,000–60 sec
Weight	266g (including battery and memory card)
Dimensions	107 x 65 x 33mm
Power supply	Li-ion battery pack (rechargeable, included)

"The Panasonic G7 produces high quality 16MP images, and offers a really well-rounded feature set"

Replacing the Panasonic G6, the G7 sits beneath the Panasonic GH4 in the company's line-up of compact system cameras. It has the same 16MP sensor as the GX7, with the processor from the GH4.

A key feature of the G7 is that it's possible to shoot 8MP images at 30fps (frames per second) using one of the three 4K photo modes in any exposure mode.

BUILD & HANDLING

If you're used to handling cameras such as the Fujifilm X-T10 or Olympus OM-D E-M10, the G7 is going to seem quite unsubstantial and lightweight by comparison, but the controls are arranged well, and the electronic viewfinder and vari-angle screen are very good.

Panasonic makes it easy to extract the 8MP images from 4K footage in-camera. In review mode, hitting the 'up' navigation key reveals all the shots in the sequence, and you then scroll quickly through until you find the most interesting images. Pressing the Set/Menu button gives you the option to save the selected frame as a JPEG. Giving the best of both worlds, the 4K video footage is saved along with the still images.

1 This nice new dial replaces the G6's function lever for settings adjustments.

2 4K photo mode is selected via the drive mode dial. The shooting option is selected via the menu.

3 Several physical and on-screen buttons can be customised to make the G7 quicker and easier to use.

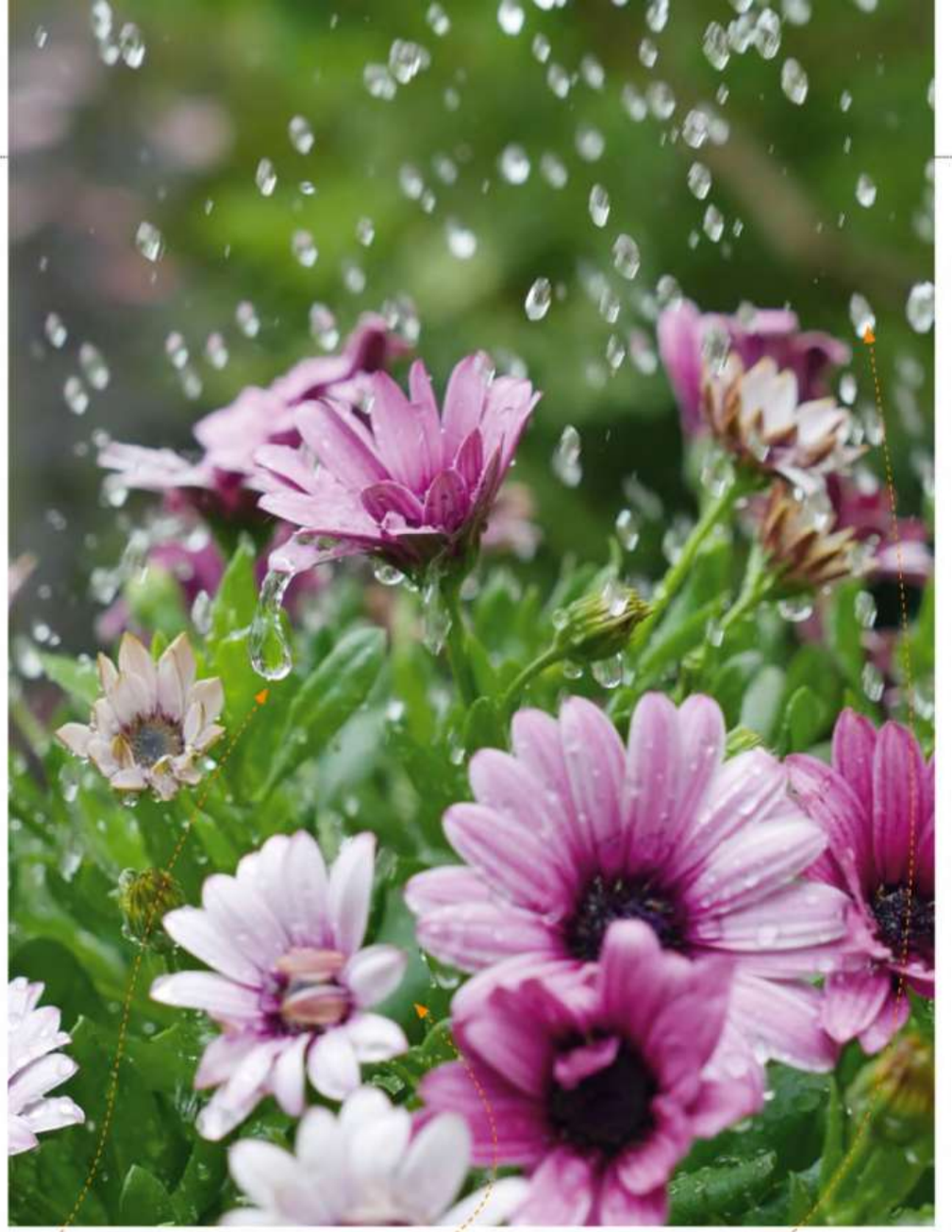
4 The responsive touchscreen is useful for composing and making adjustments.

PERFORMANCE

The G7 produces high-quality images, and noise is controlled well up to about ISO 6,400. Some ISO 12,800 images may make good A3 prints, but others are best kept to A4 or smaller, and I would avoid using the top (ISO 25,600) setting where possible.

The G7's Tracking AF system doesn't respond quickly enough for very fast-moving subjects, but if you keep the active AF point (or area) over the subject in 1-Area or Custom Multi mode with Continuous AF mode selected, in decent light it usually gets it sharp and keeps it in focus as it moves.

In 4K photo mode the AF system isn't really fast enough to shoot subjects that move quickly towards or away from the camera. It's ideal, however, for shooting action that takes place in one location.



1

4K PHOTO MODE

Shot using 4K photo (Stop/Start) mode so I could operate the camera and sprinkle water over the flowers. I used a shutter speed of 1/1,000 sec to freeze the droplets.

2

EXCELLENT METERING

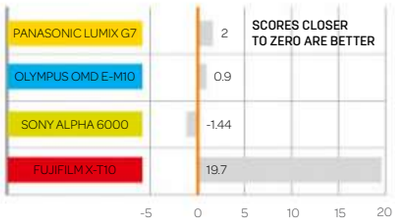
The G7's Multi Metering system does a great job in situations that some others struggle with. It's dynamic range is good, so highlights don't burn out quickly.

3

GREAT WHITE BALANCE

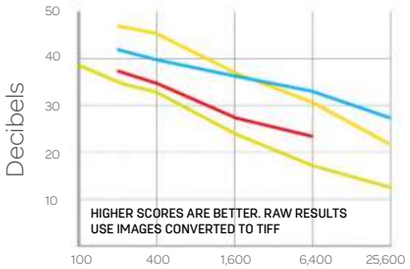
The automatic white balance system can usually be relied upon to produce natural-looking images in a wide range of situations, and colours generally look good.

COLOUR ERROR



In its default settings, the G7 delivers accurate images with a little extra saturation.

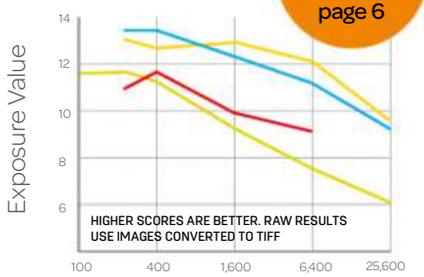
RAW SIGNAL-TO-NOISE RATIO*



The G7 puts in an impressive performance, especially at lower sensitivity settings, indicating that noise is controlled very well and images have good detail.

WHAT'S THIS? Find out how we test on page 6

RAW DYNAMIC RANGE*



Up to ISO 6,400, the G7 has a wide dynamic range, indicating that images have a wide range of tones, and that they withstand a reasonable degree of manipulation.

Meet the rivals...

The cameras taking on the Panasonic Lumix DMC-G7

For test images and resolution charts, visit www.techradar.com/cameras



Fujifilm X-T10
£799/$1,100 with 18-55mm kit lens
A slimmed down version of the superb X-T1, the X-T10 has a robust feel and traditional controls. It also has a high-quality 16MP APS-C format X Trans CMOS II sensor.
Reviewed: issue 168



Olympus OM-D
£499/$530 E-M10 with 14-42mm EZ kit lens
A 16Mp Micro Four Thirds CSC with a tilting touchscreen and high-quality viewfinder. The E-M10 is versatile, delivers great images and is compatible with a wide range of lenses.
Reviewed Issue 152



Sony Alpha 6000
£495/$698 with 16-50mm kit lens
This superb 24MP APS-C format CSC has an excellent autofocus system and a very good built-in electronic viewfinder, but the tilting screen isn't touch-sensitive.
Reviewed Issue 155

Digital Camera

FEATURES	BUILD QUALITY
PERFORMANCE	VALUE

Overall

WE SAY: Panasonic G6 users are unlikely to feel tempted to upgrade to the G7, but it's a good camera that produces high-quality images. It has a well-rounded feature set, with key features including a vari-angle touchscreen, Wi-Fi and an excellent viewfinder. It also showcases the ability to extract 8MP still images from 4K video, introducing a range of creative possibilities.



> THE SPECS	
Sensor	20.4 million pixel APS-C sized CMOS sensor (23.5 x 15.6mm)
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	Pentaprism 100% viewfinder, 0.95x magnification
Video	Full HD (1,920 x 1,080)
ISO range	100–51,200
Autofocus points	11 (9 cross-type focus points in the centre)
Max Burst Rate	5.4fps
Screen	3-inch, TFT colour LCD monitor
Shutter speeds	1/6,000–30 sec
Weight	558g (including battery and memory card)
Dimensions	93 x 120 x 70mm
Power supply	D-LI109 Li-ion battery

SLR Pentax K-S1 > With 18–55mm lens: £439 / $649 > www.ricoh-imaging.com

Flashy number

Different colours, flashing lights: are all the gimmicks of the Pentax K-S1 hiding a decent camera? **Amy Davies** finds out

Despite the fact that Pentax does indeed make some very good digital SLRs, it generally always plays second fiddle to the big names of Canon and Nikon. It's possibly for this reason that in recent years, the company has tended towards gimmicks to try and shift units.

Take the K-S1. It's available in an array of bewildering colours, including a new Sweets collection. There's also a panel of lights on the front of the camera, which are supposedly designed to guide operations.

FEATURES

Ignoring the aesthetics, at its heart, the K-S1 actually has some very decent specifications and interesting technologies — especially for an amateur-level camera. At its heart is a 20-million-pixel CMOS sensor with a sensor-based shake reduction system. In principle, this will provide an image-stabilising effect with any lens you choose to fit. This system is also used for the Pentax's distinctive Anti-Alias Simulation modes.

The sensor itself has no anti-aliasing filter, which means slightly sharper fine detail but the risk (rare in practice) of moiré or interference effects appearing in image areas with very fine patterns and textures.

The K-S1 can shoot continuously at 5.4 frames per second and it has a maximum shutter speed of 1/6,000 second. It has a proper pentaprism viewfinder, with 100% coverage. The camera also offers a selection of effects modes and a large array of digital filters; you can use these as you shoot, or apply them later.

There are 11 autofocus points, of which the nine in the centre are the more sensitive cross-type points. On the back of the camera is a 3-inch TFT LCD monitor, with a 921k-dot resolution. There's no tilt mechanism for adjusting the screen angle.



Above The green button resets whatever function is being adjusted; if it's ISO, it sets it to Auto.

You can shoot in raw format. One particularly useful factor in Pentax cameras is that its raw format of choice is DNG, rather than a proprietary camera or manufacturer format. This means that your software, whether it's Photoshop or an alternative, should already be able to read the files it outputs rather than having to wait for an upgrade.

There's no built-in Wi-Fi connectivity in the K-S1, despite the feature becoming more and more common in other cameras. There's just one memory card slot, for SD/SDHC/SDXC cards, and you'd need a second before a third-party Wi-Fi card became a realistic option.

As Pentax has been making SLRs for quite some time, there's a huge



Stick or twist? Upgrade advice

If you're looking for your first digital SLR, the K-S1 is a decent option if you're keen to avoid the big names of Canon and Nikon for whatever reason. If you've already got some Pentax gear, perhaps from the film days, it should also be pretty appealing, especially as the kit lens really isn't up to scratch.

If you're not already tied to a particular brand, though, you should take a look at the equivalent Canon and Nikon SLR models for a better overall shooting experience.

Zooming in on the... Pentax K-S1

Some quirky design helps this camera stand out



The viewfinder offers 100% coverage of your scene, which is unusual for an entry-level camera.





Activate Live View shooting by tapping this button, just next to the viewfinder.



Use the dial on top of the camera for altering shutter speed or aperture, depending on which shooting mode you're in.



The colourful rear display makes it quick and easy to see which settings are selected.

Hold down the OK button to switch between using the directional keys for their dedicated function or for setting the AF point.





The shooting mode dial is on the back of the K-S1 – one of a few design choices that set it apart.

range of lenses available, so those who had an old Pentax film camera and a collection of glass might be tempted by this digital model.

BUILD AND HANDLING

The K-S1 has quite a boxy and utilitarian look to it, with squared off edges, compared with the rounder, softer edges you might find on a Canon or Nikon SLR. There's a pretty hefty grip on the right-hand side of the camera, but our fingers didn't sit all that comfortably on it. There's also no recess where your forefinger might sit a bit more flush with the camera.

> "In a design choice that is likely to divide opinion, there's a strip of lights built into the grip"

In a design choice that is likely to divide opinion, there's a strip of lights built into the grip of the camera, which illuminates when the camera is first switched on. If you're using the self-timer mode, the strip will flash in different sections to indicate when the shutter is about to be released.

A light also encircles the shutter release button and pulsates slowly when the camera is on but not currently being used, or is on constantly when the camera is active. If you switch to video record mode, the light will turn red.

A fairly large dial on the top of the camera can be used to alter the aperture or shutter speed, depending on the shooting mode that you're in. This dial is easily reached with your thumb and is stiff enough to not accidentally slip out of place while you're shooting, but not too stiff to be difficult to turn. You also use this dial to adjust exposure compensation

Meet the rivals...

The cameras taking on the Pentax K-S1



Nikon D3300
Price with 18–55mm lens: £400 / $499
An excellent choice as a first digital SLR: lots of detail, and quality images.
Reviewed: page 78
★★★★★

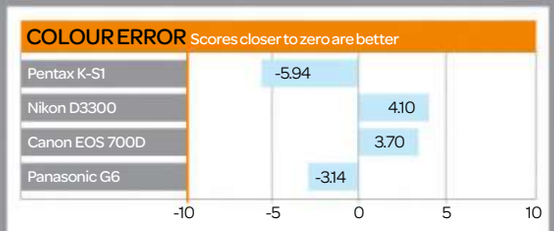


Canon EOS 700D
Price with 18–55mm lens: £539
A capable camera that produces quality images and affords lots of control.
Reviewed: issue 140
★★★★★



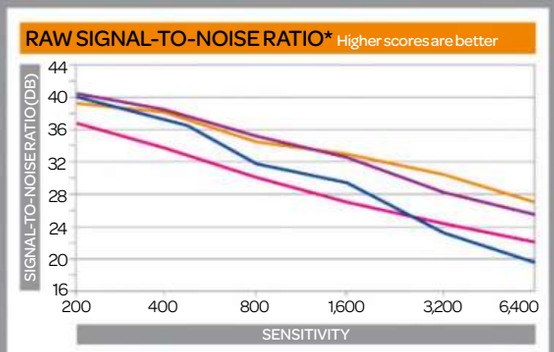
Panasonic G6
Price with 18–55mm lens: £399
A well-rounded CSC that features just about everything you'd want.
Reviewed: issue 142
★★★★★

CAMERA BENCHMARKS
How does the K-S1 fare against its rivals?

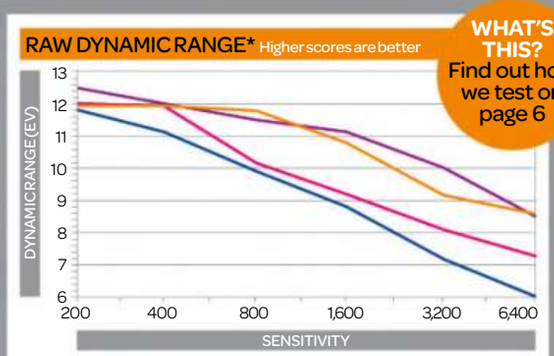


COLOUR ERROR RESULT: The K-S1 produces the least accurate colours in the lab, but real-world results are pleasant enough.





NOISE RESULT: Another impressive result here. This time the noise result matches closely with that of the Canon EOS 700D.



WHAT'S THIS? Find out how we test on page 6

DYNAMIC RESULT: The K-S1 has an impressive dynamic range, matching closely with the Panasonic G6.

OVERALL BENCHMARK RESULT
When looking at JPEG images, the camera is slightly less impressive – which is a shame considering that most beginner users will work with these files rather than raw-format files. For dynamic range, the K-S1 sits somewhere in the middle of the group, while for noise reduction it fares a little better, coming second in the group after the Panasonic G6.

* Raw results use images converted to TIFF



Above Colours have pleasant saturation and fairly natural tones in the default settings.

after you've pressed the exposure compensation button.

Each of the directional keys also gives you access to a dedicated function, such as ISO (up) and white balance (down). In the middle of the navigational pad is a large OK button, which – you guessed it – lights up. Hold this down to switch between using the directional keys to set the autofocus point, and using the directional keys for their dedicated functions. This approach can make it a bit of a slow process when you want to quickly change a setting, but it's something you soon get used to.

As the four directional buttons and the OK button sit fairly flush to the camera, they're not easy to navigate by touch alone, for example when you're holding the camera up to your eye to shoot.

Just behind the lens mount is a switch for moving between manual focus and automatic focus. It's a fairly loose dial, so it is reasonably easy to accidentally knock it out of place while the camera's in a bag or something. This can leave you wondering why it's not focusing.

Sadly, the kit lens for the K-S1, an 18–55mm f/3.5–5.6 zoom, is a real let-down. Both Canon and Nikon have super-smooth, near-silent AF motors built into their lenses, but this one is driven by a focusing screw in the lens mount. It's quick enough, but it's coarse and noisy, and will hunt and hesitate in some situations.

> "The camera's 20-megapixel sensor is capable of resolving a good amount of fine detail"

PERFORMANCE
Colours in JPEG images direct from the camera are bright and punchy, showing a nice level of saturation without being unrealistic. Comparing colours in the raw-format DNG files shows a more muted palette, which gives you good scope for working with the files to get exactly the look you need. Meanwhile, the camera's 20-megapixel sensor is capable of resolving a good amount of fine detail, probably a result of not having an anti-aliasing filter.

Other Pentax cameras we have tested have suffered a little from



underexposure in some conditions, but the K-S1 performs a lot better in this area, providing well-exposed images in a variety of situations. If it's a very high-contrast scene, however, you may still need to dial in some exposure compensation.

Above There are plenty of lenses for the K-S1's K mount; it's a good idea to ditch the kit lens if you can. This was taken with an 18-135mm lens.



Left The K-S1 body has a rather angular shape that will have its lovers and detractors.

The automatic white balance system does a pretty good job in most conditions, providing accurate colours directly from the camera. It errs ever so slightly towards yellow and orange tones under artificial lighting in our test images, but if you're finding this to be a problem, you can simply switch to a more appropriate white balance preset.

Images taken in low light at high sensitivity display a good level of noise control. Right up to around ISO 3,200, picture noise is barely visible at all, even you're examining an image at 100%. Even at ISO 6,400, there's barely any noise apparent, and at normal printing and web sizes (such as A4 or below) the overall impression of detail is excellent.

VERDICT

Overall, this camera is a decent purchase for people who are looking for their first digital SLR. Some will undoubtedly be put off by the design choices on offer here from Pentax, principally the liberal use of status lights, while others will welcome them. If you buy from a camera shop, you can handle the camera first to see what you think.

Factor in some budget for replacing the kit lens and you'll no doubt be pretty happy with the camera. But if your budget is inflexible, you're probably better looking at the similarly priced alternatives from Canon or Nikon, which come with much better kit lenses.

Digital Camera

FEATURES	BUILD QUALITY
★★★☆☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★☆☆	★★★★☆

Overall ★★★☆☆

WE SAY: The K-S1 is a decent choice for those looking for their first digital SLR, but it's even more enticing if you already have some Pentax gear – especially a lens or two to replace the duff kit lens.



SLR Pentax K-S2 > With 18-50mm kit lens: £621 / $799 > www.ricoh-imaging.co.uk

Keep it simple

The K-S2 is an appealing first-time SLR for those not drawn towards the big guns. **Amy Davies** finds out how well it performs

> THE SPECS

Sensor	20.1MP CMOS sensor, 23.5 x 15.6mm
Focal length conversion	1.5x
Memory	SD / SDHC / SDXC
Viewfinder	Pentaprism optical viewfinder, 100% coverage
Max Video Resolution	Full HD (1,920 x 1,080) at 30, 25 and 24p
ISO range	100–51,200
Autofocus points	11 points (9 cross-type in centre)
Max Burst Rate	5.4fps
Screen	Vari-angle 3-inch TFT color LCD monitor
Shutter speeds	1/6,000–30 sec, Bulb
Weight	678g (including battery and memory card)
Dimensions	91 x 123 x 73mm
Power supply	Rechargeable li-ion battery D-LI109 (supplied)

Despite having a similar name to the K-S1, the K-S2 is not a replacement, but rather a camera which sits above it in the line-up. Internally, however, it shares a lot of the same specifications, including the same sensor and processor.

An important point of distinction between the two is the way each is used. The K-S2 is a lot less gimmicky than its sibling (which we tested in *Digital Camera* 161), which should make it a little more appealing to enthusiast photographers.

FEATURES

The K-S2 is the world's smallest and lightest weatherproof SLR, which should make it capable of resisting the odd rain shower or two – something that is particularly useful for landscape and street photographers.

Pentax has thrown in a few other firsts here too – at least for this manufacturer, if not for the digital SLR market as a whole. For example, it has a fully articulating screen, although it's not touch-sensitive. Wi-Fi and NFC connectivity are built in too, and can be used in conjunction with a free Image Sync app, available for both iOS and Android devices.

A new kit lens has been introduced for the K-S2. It's an 18-50mm f/4-5.6 optic, which retracts in on itself to reduce the overall size of the system when in storage or being carried.

Like other Pentax SLRs, the K-S2 has a built-in sensor-based SR Shake Reduction system. Other useful features in the K-S2 include a maximum burst rate of 5.5 frames per second and a fastest shutter speed of 1/6,000 sec.

As with the K-S1, the K-S2's sensor has no anti-aliasing filter, which helps to maximise the camera's capability of resolving detail.

Below The K-S2's K mount means there are plenty of compatible lenses.



BUILD AND HANDLING

With its diminutive size, the K-S2 feels almost more like some of the larger compact system cameras on the market than an SLR. The kit lens and some other lenses you can buy for the system are also pretty small.

Speaking of the kit lens, you need to hold down a small button on the side of it to extend it before you can use it. If you're planning on taking quite a few photos in succession, it's best to leave it extended. A small ring around the front of the lens is used to



Stick or twist? Upgrade advice

If you're looking for your very first digital SLR and you're not too bothered about picking up one of the two big names (Canon or Nikon), the K-S2 makes for a credible alternative. It's got weatherproofing and a 100% optical viewfinder, and produces some great images. If you had a Pentax SLR like the K-500 (pictured) in the past, you'll be able to use its lenses – a great reason to pick this up. This could also be a good step up from an entry-level model made by another brand.

Zooming in on the... Pentax K-S2

Well-considered controls make this SLR a pleasure to use



"Although the KS-2's grip is quite small, it still feels pretty comfortable in the hand"

extend the zoom – which in practice is a little fiddly compared with the much larger zoom rings of other kit lenses. It's something you get used to with time, though.

Although the KS-2's grip is quite small, it still feels pretty comfortable in the hand. Two scrolling dials – one on the front of the grip, and a second on the rear, make for quite a natural and pleasing way to change settings. These dials control different functions depending on the shooting mode you're using. For instance, with Aperture Priority the rear dial will control aperture while the front dial does nothing. The good news is that you can customise how each dial works if you prefer a different way.

The vast majority of the K-S2's buttons can be found on the right-hand side of the camera, which makes it easy to make changes with just one hand. One of the most useful is a green button which takes certain settings – such as exposure compensation – back to default.

There's also a button on top of the camera, which you hold down to activate the K-S2's Wi-Fi system. If you have an NFC-enabled device you simply need to tap it on the camera where you see the NFC chip symbols,

Meet the rivals...

The cameras taking on the Pentax K-S2



Canon EOS 700D
With 18-55mm lens: £469 / $699
A comprehensive feature set makes this agreat all-rounder. There's a vari-angle touchscreen, but no built-in Wi-Fi. Sold as the Rebel T5i in the US.
Reviewed: issue 140
★★★★★



Nikon D5500
With 18-55mm lens: £599 / $845
Expect great images from this fantastic entry-level model with a very useful feature set, including an articulating touchscreen and built-in Wi-Fi.
Reviewed: page 82
★★★★½



Sony A6000
With 16-50mm lens: £495 / $698
This small and sleek model is almost the perfect compact system camera. It has a great viewfinder and produces fantastic images, too.
Reviewed: page 120
★★★★★

CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

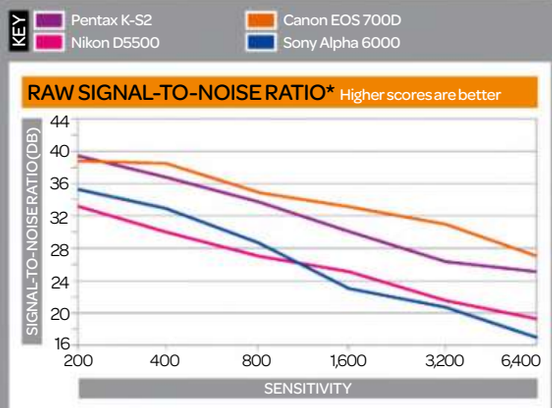
CAMERA BENCHMARKS

How does the Pentax K-S2 fare?

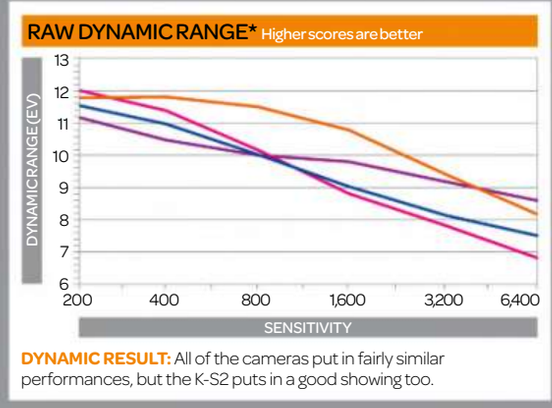
WHAT'S THIS? Find out how we test on page 6



COLOUR ERROR RESULT: The K-S2 isn't not the best performer in the lab, but generally colours in real-world situations are very good.



NOISE RESULT: The K-S2 puts in an excellent performance, holding its own with all of the competitors here, and capturing clean images.



DYNAMIC RESULT: All of the cameras put in fairly similar performances, but the K-S2 puts in a good showing too.

OVERALL BENCHMARK RESULT

The K-S2 has impressed in our labs tests, putting in a great performance both for JPEG and raw images. It perhaps competes most closely with the Canon EOS 700D, but the Nikon D5500 isn't too far behind either. We have included the A6000, a compact system camera, which also delivers excellent results.

* Raw results use images converted to TIFF



General-purpose metering sometimes needs a boost from exposure compensation for a balanced exposure.

and a connection will start straight away. If you have a Wi-Fi-only device, you can connect directly to the camera, too. The free Image Sync app, available to download from the App Store or Google Play store, is very useful, allowing you to control every almost element of camera operation.

Although it's nice to have a 100% viewfinder, as it is optical, it means that you won't be able to see any changes made to settings until you look at the shot on the rear screen.

Right Not a fan of the orange trim? A conventional black design is available, along an out-there white model.

PERFORMANCE

As the K-S2 uses the same sensor and processor combination as the K-S1, there was little doubt that its image quality would be almost identical. Luckily, image quality is one of the best thing about the K-S2's sibling, and it continues to impress here.

Looking at shots direct from the camera without editing, JPEG images are nicely saturated, with vibrant colours which pop well, even when using the Natural setting.

If you're shooting in raw format, it's possible to see a slightly more muted palette in the DNG files the K-S2 creates, but this gives you good scope for post-production editing. Our labs results show that the K-S2 puts in a good performance for dynamic range across the sensitivity scale, being reasonably close to the Nikon D5500, which is borne out in real world shooting, too.

You can change the way colours look direct from the camera in a couple of different ways. First of all, you can choose a different Custom Image preset – there are conventional options like Portrait and Landscape,

"Directly from the camera, JPEG images are nicely saturated, with vibrant colours which pop well"





but also a couple of 'out there' choices like Bleach Bypass and Reversal Film. Alternatively, you can use one of the Digital Filters, which are generally a little wackier, but also worth a look.

As we saw before with the K-S1, the K-S2's sensor can resolve a good amount of detail, thanks to the removal of the anti-aliasing filter. Looking at JPEG images taken at low sensitivities at 100% resolution, images appear very sharp and there's very little image soothing. Even when looking at images shot at higher sensitivities, such as ISO 3200, detail is still resolved well – and at normal printing and web sizes, the overall impression of detail is fantastic.

Above Use digital filters (this is High Contrast) to experiment with the way your shots look.



Left Although it's small, the K-S2 has a comfortable grip.

The camera's Shake Reduction system also works well to combat blur in images, meaning you can use it without worrying too much if the camera is 100% steady.

Looking at raw files, it's clear that the camera applies a fair amount of noise reduction to JPEGs when shooting at high sensitivities, as it's possible to see speckling and chroma noise. This gives you good scope for applying your own noise reduction to raw files, should you wish. The maximum sensitivity we're recommend using is ISO 12,800, or for best quality, below ISO 3,200.

On the whole, the K-S2's automatic white balance system copes well with a variety of different light sources. However, at times it can get a little confused in some scenarios, such as overcast light. The camera is fairly capable under artificial light, but can err towards the warm side. Switching to a more appropriate white balance setting – such as Tungsten – can be helpful if it's really struggling.

> "For an entry-level camera, you get a great range of specifications, such as weatherproofing and a 100% viewfinder"

VERDICT

There's a lot to like about the K-S2. Pentax is offering a good range of functions for the money. If you're not in the Nikon, Canon or possibly even Sony camps, this makes a good alternative. For an entry-level camera, you get a great range of specifications, such as weatherproofing and a 100% viewfinder. Meanwhile, the built-in Wi-Fi and NFC options are quick, easy to use and accompanied by a genuinely useful smartphone app.

Digital Camera

FEATURES	BUILD QUALITY
★★★★★	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★★★☆

Overall ★★★★☆

WE SAY: With a great feature set, good-quality images and a natural way of operation – it's easy to recommend the K-S2 to a wide range of people, particularly first-time SLR buyers.

> THE SPECS	
Sensor	20.5MP one-inch CMOS sensor (13.2 x 8.8mm)
Focal length conversion	2.7x
Memory	Micro SD / Micro SDXC / Micro SDHC
Viewfinder	None
Video	1080p
ISO range	160 to 12,800
Autofocus points	21 in normal mode; 35 in close-up mode
Max burst rate	Up to 6fps
Screen	Three-inch, 460k-dot, TFT touchscreen LCD
Shutter speeds	1/6,000 – 30 sec plus Bulb
Weight	196g
Dimensions	110.4 x 61.9 x 22.5mm
Power supply	B740AE rechargeable lithium – ion battery (supplied)



CSC Samsung Mini NX with 9mm lens > £199 / $289 > www.samsung.com

Small system

With a brand-new mount as well as a new sensor size, is Samsung's NX mini worth taking a chance on? **Amy Davies** finds out

While many compact system cameras are the natural competitor for the hefty SLR, there are other, smaller systems that find their competition more readily within the compact arena. To produce the ultra-small NX mini, Samsung has used a 20.5-million-pixel one-inch type sensor — the same physical size as found in the Nikon 1 range of CSCs and the Sony RX100 fixed-lens compact cameras.

A new sensor size means a new mount, and therefore a new range of lenses. So far, there are just three such optics available to buy: a kit zoom lens, with a focal range of 9-27mm (roughly equivalent to 24-72mm in 35mm terms); a 9mm f/3.5 pancake lens (24mm equivalent); and a 17mm f/1.8 lens (45mm equivalent).

FEATURES

Samsung is aiming this camera at a beginner audience, but you can take manual and semi-automatic control of the NX Mini. It can also shoot in raw format.

The camera's screen rotates through 180 degrees, making it particularly useful for taking self-portraits, but also for coping with other awkward angles. It doesn't tilt downwards, so you won't be able to use it for overhead shots. The screen is touch-sensitive, though.

Unsurprisingly for something so small, there's no built-in viewfinder.

Above Samsung's pulled out all the stops to make a tiny swappable-lens system, in the form of the NX mini

There is Wi-Fi and NFC connectivity, though, and to keep the size down, Micro SD Cards are used.

BUILD AND HANDLING

If you're using the NX mini with the 9mm pancake lens, you'd be forgiven for thinking it was an ordinary compact camera. It looks a little less balanced with the 9-27mm zoom lens, even though the lens collapses into itself to make it smaller.

Despite its small size, and the fact that it offers a touchscreen, there's still a decent number of buttons to

> "A new sensor size in the NX mini means a new mount, and therefore a new range of lenses"

Meet the rivals...

See how the NX mini stands up against the competition



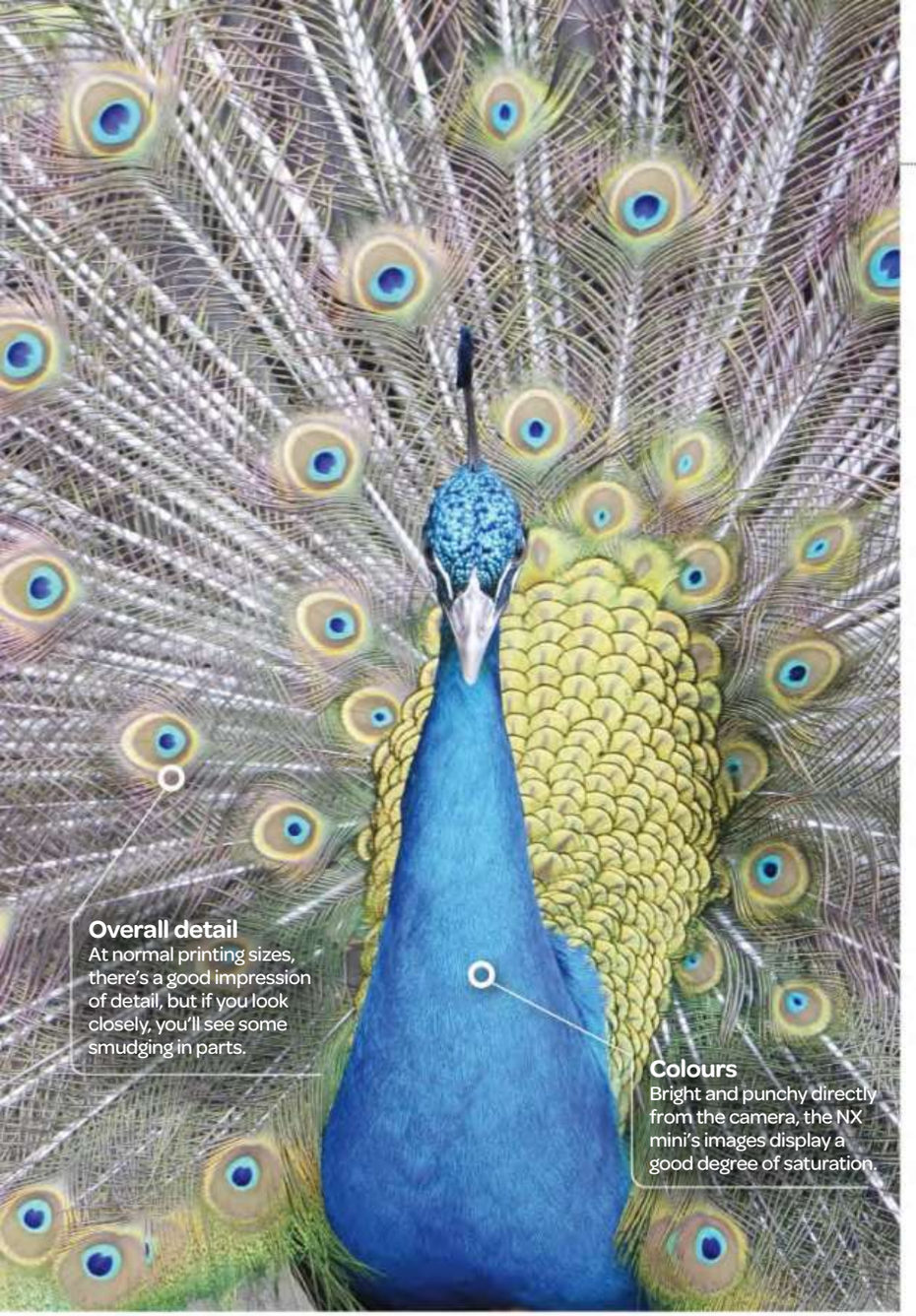
Panasonic GM1
With 12-32mm lens:
£449 / $449
This small CSC still manages to fit in a good, large image sensor.
Reviewed: issue 149
★★★★★



Nikon S1
With 11-27.5mm lens:
£229 / $349
With good image quality but a few usability niggles, the S1 is the smallest CSC Nikon makes.
Not reviewed



Sony RX100 III
£569 / $798
A compact camera with a fixed 24-70mm lens, the RX100 III manages to squeeze in a high-res electronic viewfinder.
Not reviewed



be found on the NX mini. That said, most of the camera's operation, if you want to control it manually, takes place via the screen. Setting the AF point requires a quick tap.

Alternatively, you can access the function menu by pressing a virtual button in the bottom right-hand corner of the screen. There's not much in the way of customisation on offer, either in terms of the buttons or the menu options.

PERFORMANCE

Looking at images at normal printing or web sizes, you get a good impression of detail. However, even images taken at the lowest end of the sensitivity run display areas of smudging when viewed at 100%.

On the plus side, colours are bright and punchy straight from the camera, with a nice amount of vibrance. The camera's metering system keeps exposures well-balanced, but occasionally it is prone to underexposure. You may need some positive exposure compensation.

The auto white balance system does a good job of producing accurate colours, even when faced with tricky mixed or artificial lighting. Autofocus is quick and generally accurate. When the light drops, focussing is a little slower.

Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★☆☆	★★★☆☆

Overall ★★★☆☆

WE SAY: The Samsung NX mini is an interesting camera, and offers reasonable value for money. But investing in a new lens mount system could be risky if the camera doesn't prove popular.

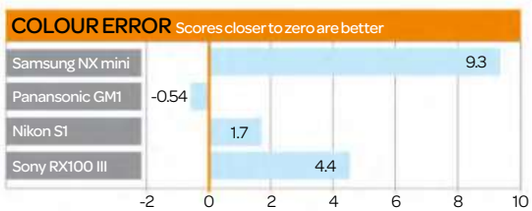


WHAT'S THIS? Find out how we test on page 6

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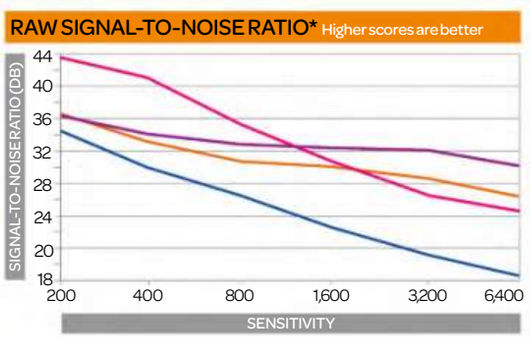
CAMERA BENCHMARKS

How does the NX mini fare aginst its rivals?

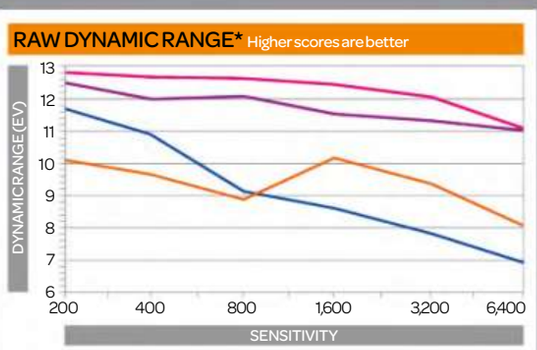


COLOUR ERROR RESULT: Our tests show that the NX mini has the least accurate colours, although images have a pleasing warm tone.





NOISE RESULT: The NX mini is a consistent performer, but while it beats the S1, it's the Panasonic GM1 that comes out on top here.



DYNAMIC RESULT: Although Panasonic's GM1 is again the best performer, the NX mini does well and shows a good dynamic range.

OVERALL BENCHMARK RESULT

While the NX mini is not the best performing camera on test here, it should be noted that the GM1 has a much larger sensor. In terms of those cameras with the same-sized sensor, Sony's fixed-lens compact RX100 III is an excellent competitor.

* Raw results use images converted to TIFF

> THE SPECS	
Sensor	APS-C format BSI CMOS sensor with 28.2 million effective pixels
Focal length conversion	1.5x
Memory	SD / SDHC / SDXC
Viewfinder	N/A
Video	4K (4,096 x 2,160) MP4 format with HEVC compression
ISO range	100-25,600 expandable to ISO 51,200 for stills, ISO100-6,400 for video
Autofocus points	4,205 phase detection points (153 cross-type) and 209 contrast detection
Max burst rate	9fps
Screen	Touch-sensitive three-inch, 1,036,000-dot Super AMOLED
Shutter speeds	30-1/6,000 sec plus Bulb
Weight	292g (body only)
Dimensions	119.5 x 63.6 x 42.5mm
Power supply	Lithium-ion battery (supplied)



CSC Samsung NX500 > £599 / $799 with 16-50mm kit lens > www.samsung.co.uk

Small wonder

The NX500 has the same sensor and AF system as the NX1. **Angela Nicholson** finds out if she's got a bargain on her hands

The Samsung NX1 really impressed me when I tested it so the fact that the NX500 has the same backside-illuminated (BSI) APS-C format CMOS sensor with 28.2 million effective pixels, hybrid autofocus (AF) system and 4K video recording capability for a fraction of the price is pretty exciting.

One key difference between the NX1 and the NX500 is that the NX500 doesn't have a viewfinder. However, there's the same three-inch, 1,036,000-dot Super AMOLED touch-sensitive screen.

BUILD AND HANDLING

Rather than the SLR-like design of the NX1, the NX500 has the rectangular shape of the NX300. It's also not weatherproof, and although its metal body feels pretty solid, a faint clicking or creaking sound when you hold the grip tightly suggests there's a little bit of flex somewhere.

I found the exposure compensation button awkward to use in the default set-up. But thankfully, it's possible to customise the use of this button as well as the auto exposure lock button and the two command dials. I set one of the command dials to adjust exposure compensation directly when shooting in Aperture and Shutter Priority modes.



Above The NX500 has a stylish two-tone finish.

Helpfully, the NX500 is compatible with i-Function lenses. I found the iFn Standard control option the most useful as this turns the focus ring into a control dial for adjusting aperture, sensitivity, exposure compensation and white balance.

Even in quite bright light, the responsive AMOLED screen provides a superb view when viewed straight on and its brightness is boosted. However, it's much less clear when viewed from a slight angle because reflections become problematic.

PERFORMANCE

Like the NX1, the NX500 is capable of resolving fine detail. However, with the 16-50mm f/3.5-5.6 kit lens in place, the extra four million effective pixels that it has over the Sony Alpha 6000 (with its comparable kit lens) don't bring it much advantage. The two cameras capture a similar level

Meet the rivals...

The cameras taking on the NX500...



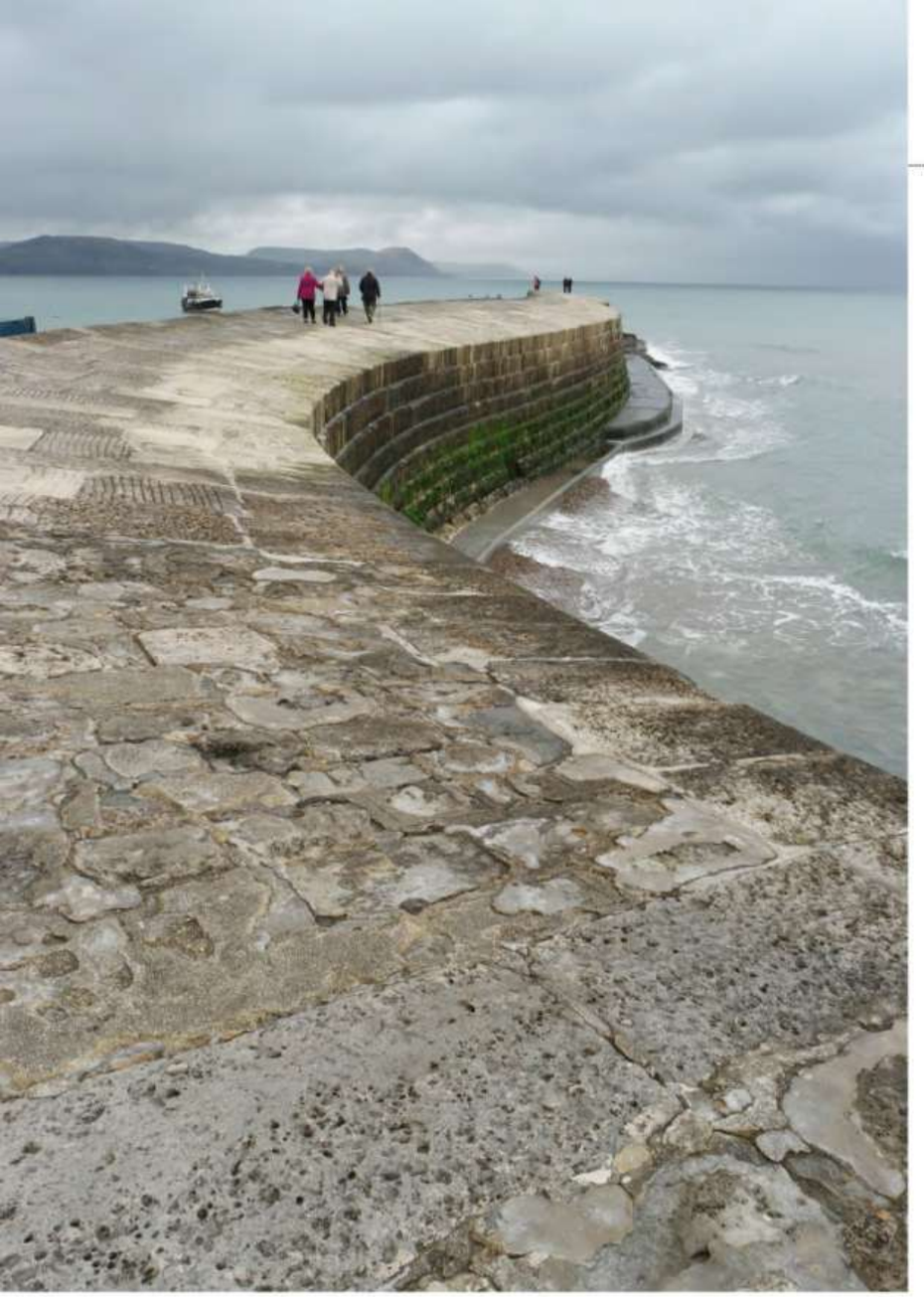
Sony Alpha 6000
£510 / $698 with 16-50mm kit lens
This 24MP APS-C format CSC has an excellent autofocus system and a built-in viewfinder, but there's no touch control.
Reviewed: page 120
★★★★★



Panasonic GX7
£470 / $798 with 14-42mm kit lens
The 16MP GX7 has touch-screen control, a tilting screen and a viewfinder that can flip up for viewing from above.
Reviewed: issue 144
★★★★★



Olympus OM-D E-M10
£399 / $499 without lens
Another 16MP CSC with a tilting touchscreen and built-in viewfinder, the E-M10 has lots of customisation options and takes great images.
Reviewed: page 94
★★★★★



of detail up to ISO 800, but by ISO 1,600 the NX500's detail resolution drops below that of the Sony Alpha 6000's. Nevertheless, even at ISO 25,600, the NX500 is able to achieve a very respectable resolution score.

When the Picture Wizard is set to Off or Standard, the NX500 produces natural-looking JEPG images in a range of conditions. The automatic white balance system also copes well with most natural light situations.

Like the NX1, the NX500 has an impressive autofocus system capable of getting subjects sharp very quickly. It even does a good job with moving subjects, but they are hard to follow without a viewfinder.

While the Samsung Auto Shot (SAS) modes are a little gimmicky, they can be good fun, especially Jump Shot mode which makes it easy to photograph a person jumping. However, there are few situations in which I'd want to use Trap Shot mode as it tends to produce images where the subject is heading out of the frame, which is not usually good for composition.

VERDICT

The NX500 offers a considerable saving on the NX1. This comes at the cost of the viewfinder, a change in shape and the loss of weatherproofing, but you get the same superb sensor and images.

Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★★★☆

Overall ★★★★☆

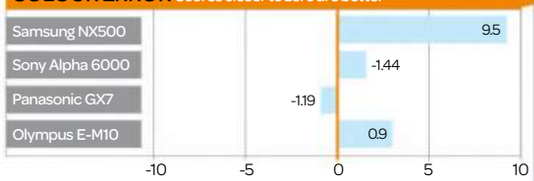
WE SAY: If you can live without a viewfinder, the NX500 is an excellent camera. It offers lots of control options with a good user interface, captures lots of detail and gets subjects sharp quickly.

CAMERA BENCHMARKS

How does the NX500 measure up?

WHAT'S THIS? Find out how we test on page 6

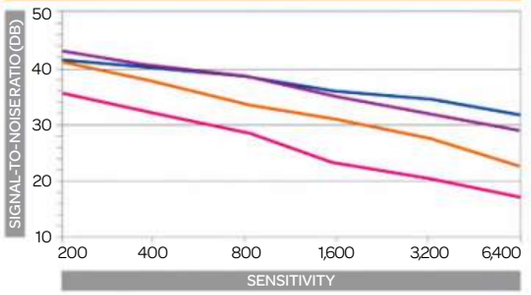
COLOUR ERROR Scores closer to zero are better



COLOUR ERROR RESULT: The NX500 produces the most highly saturated images of the bunch, but they usually look good.

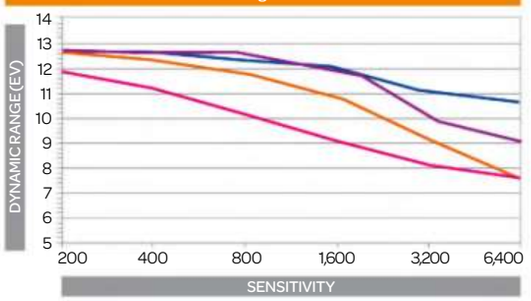
KEY: Samsung NX500, Sony Alpha 6000, Panasonic GX7, Olympus E-M10

RAW SIGNAL-TO-NOISE RATIO* Higher scores are better



NOISE RESULT: Despite the high pixel count the NX500 manages to control noise well, even at quite high sensitivity values.

RAW DYNAMIC RANGE* Higher scores are better



DYNAMIC RESULT: At low sensitivities the NX500 captures a wide tonal range. Its performance holds well up to around ISO 1,600.

OVERALL BENCHMARK RESULT

The combination of a back-illuminated sensor design and a fast processor enables the NX500 to put in a good performance in our lab. Our findings back up our real-world shooting experience: it captures a lot of detail, controls noise well and has a wide dynamic range. The raw files respond well to post-capture adjustment.

*** Raw results use images converted to TIFF**

Above Colours are usually well-saturated, but still quite natural.

Right The screen tips right up to help with selfies.





> THE SPECS	
Sensor	24.3 million pixel APS-C CMOS sensor
Focal length conversion	1.5x
Memory	SD / SDXC / SDHC
Viewfinder	N/A
Video	Full HD (1,920 x 1,080p)
ISO range	100–25,600
Autofocus points	179 points (phase-detection), plus 25 points contrast-detection
Max burst rate	6 frames per second
Screen	Three-inch, 922k-dot, tilting touchscreen
Shutter speeds	1/4,000 sec–30 seconds, Bulb
Weight	283g (with battery and memory card)
Dimensions	109.6 x 62.8 x 35.7mm
Power supply	NP-FW50 W-series rechargeable battery

CSC Sony Alpha 5100 > With 16-50mm PZ lens: £549 / $649 > www.sony.com

Start here

The Sony Alpha 5100 could be one of the best CSCs on the market for beginners. **Amy Davies** finds out how well it performs

Sony has fitted the A5100 with the same excellent 24.3MP sensor and Bionz X processor found in the A6000. The sensor is APS-C sized, but features the same gapless on-chip lens structure as the full-frame A7R. This should make it good in low light.

FEATURES

Like the NEX-5T, the A5100 has a three-inch 922k-dot LCD screen that is touch-sensitive and can be flipped up through 180 degrees. Touch control is fairly limited, however, as it can only be used for setting the AF point or tripping the shutter.

Thanks to the new processing engine, sensitivity range also stays the same at ISO 100–25,600, despite the increase in pixel count.

The Alpha 5100 has Wi-Fi and NFC connectivity and is compatible with PlayMemories apps to expand its feature set. These can be downloaded from the PlayMemories store directly to the camera.

BUILD AND HANDLING

The Alpha 5100 is smaller than either the A6000 or the NEX-5T, with no top control dial. The camera makes more use of the navigation controls.

Despite its small size and light weight, the A5100 feels solid. It's most suited to use with the 16-50mm f/3.5-5.6 lens in terms of proportions – using it with something large like the Zeiss 16-70 f/4 lens makes it feel slightly unbalanced.

Above The Alpha 5100 is small and sleek, yet still has a decent grip.

The touchscreen makes setting the AF point quick and easy. Once you've set the AF mode to Flexible Spot, simply tap the area on the screen. It's a shame the menu can't be navigated via the touchscreen.

PERFORMANCE

Colours directly from the camera are vibrant, with good saturation. Detail is rendered well by the sensor. When zooming in at 100%, the impression of detail is great, giving you good scope to crop an image.

In most cases, the A5100's metering system produces accurate exposures. The useful Dynamic Range Optimiser function helps you get a balanced exposure when one area of the scene is darker or brighter than the rest. The automatic white balance

Meet the rivals...

The A5100 enters a strong market for starter-level CSCs



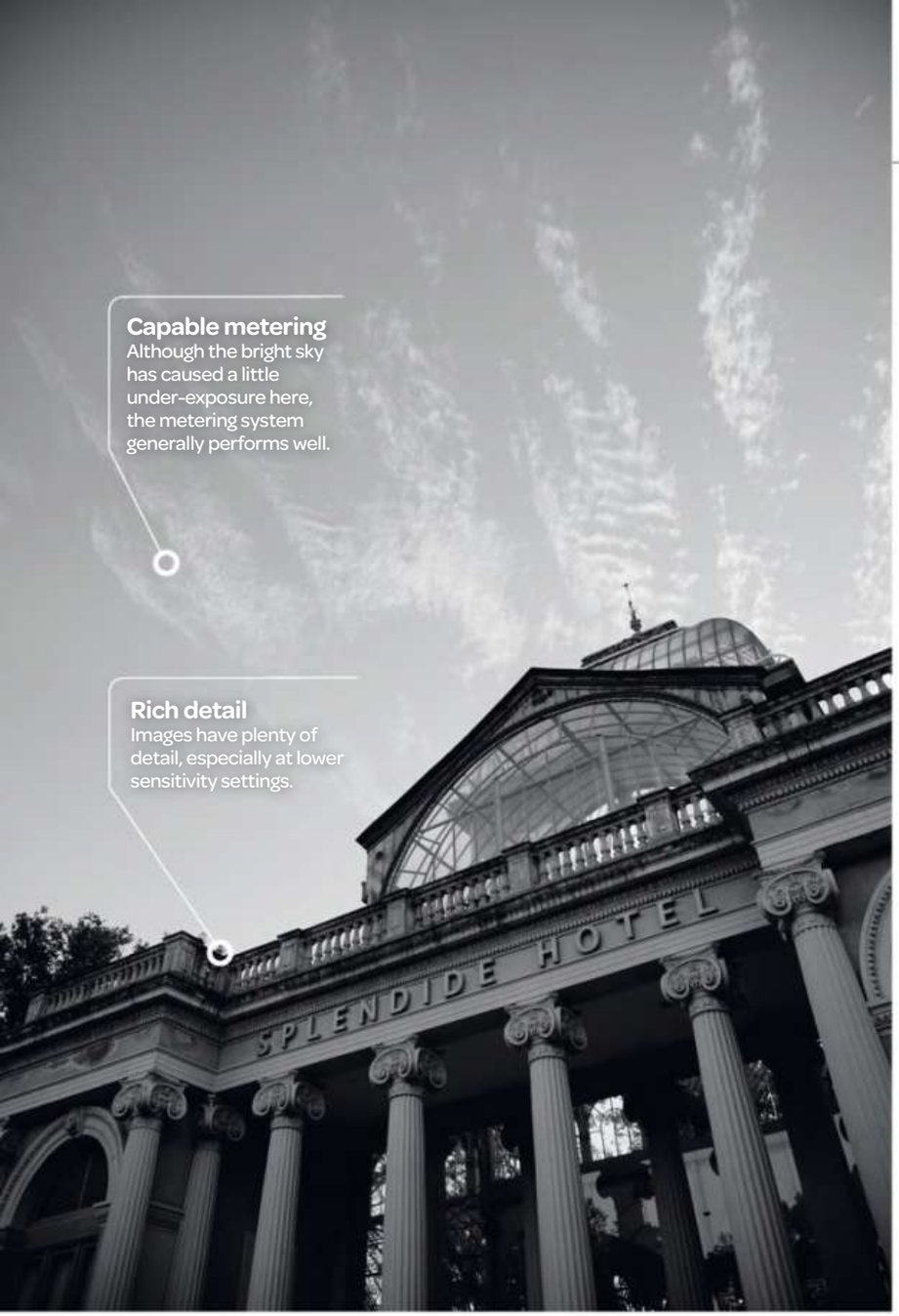
Fujifilm X-M1
£389 / $599
(with 16-50mm lens)
Combines classic retro looks with everything you need for excellent pictures.
Reviewed: issue 145



Panasonic GF6
£299 / $448
(with 14-42mm lens)
One of the best CSCs on the market, especially for the beginner user.
Reviewed: issue 153



Olympus E-PM2
£338
(with 14-42mm lens)
The OM-D sensor makes this small CSC a terrific little purchase.
Reviewed: issue 136



Capable metering
Although the bright sky has caused a little under-exposure here, the metering system generally performs well.

Rich detail
Images have plenty of detail, especially at lower sensitivity settings.

system does a decent job of producing accurate colours in most situations. It can err a little towards warmer tones under artificial light.

The A5100 copes well on high sensitivity settings – at ISO 3,200, for instance, you get an excellent overall impression of detail, and low noise. If you examine at 100%, you can see some areas of the image have a slight painterly effect. If you examine a raw-format image, you can see that the camera's noise reduction is fairly heavy-handed. You can set your own level of noise reduction using Sony's raw data converter software or in third-party software.

Although it's not quite as quick as Micro Four Thirds cameras, the A5100's AF system locks onto targets rapidly. As the light drops, so do acquisition speeds, but it's only rarely that the AF system fails. Shot-to-shot times are decent.

VERDICT

Sony has again produced a capable camera. Images are punchy direct from the camera, while the amount of detail is impressive.

Pitched at first-time buyers of interchangeable-lens cameras, the A5100 and its kit lens make a good system to get started with.

Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★★★☆

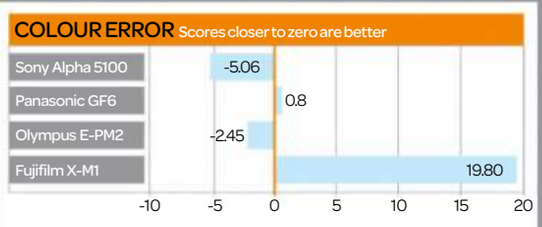
Overall ★★★★☆

WE SAY: A well-performing camera with just a few small let-downs. A good range of features for the novice photographer at a reasonable price. Look out for E-mount lenses to make the most of the sensor.

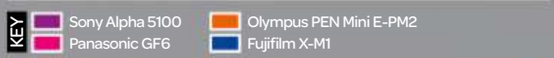


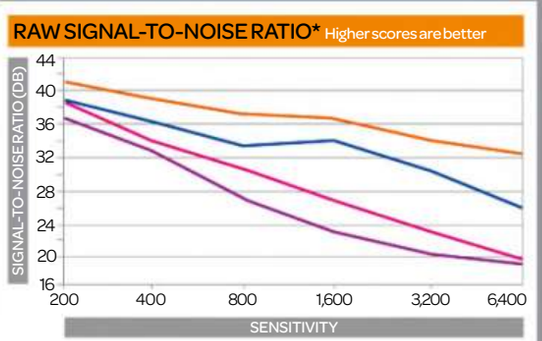
CAMERA BENCHMARKS

How does the Alpha 5100 measure up?

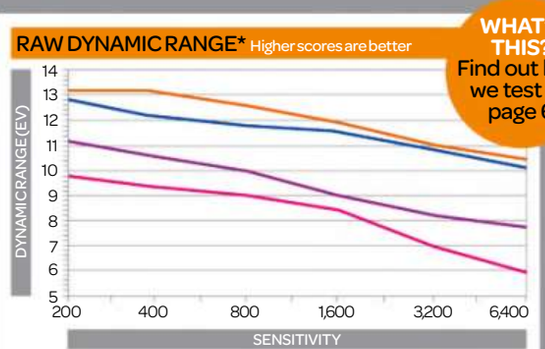


COLOUR ERROR RESULT: Although not the most accurate in the test, the Sony produces vibrant and pleasingly warm images.





NOISE RESULT: Although the graph appears to show a relatively low result, this could be an indication of how well detail is kept.



WHAT'S THIS? Find out how we test on page 6

DYNAMIC RESULT: The Alpha 5100 fares pretty well for dynamic range, comfortably beating the Panasonic GF6.

OVERALL BENCHMARK RESULT

In terms of signal-to-noise ratio, the A5100 fares much better when examining JPEG images, which is good news for those who don't want the hassle of editing raw-format images. It's ideal for beginners, who prefer to rely on consistently good images directly from the camera.

* Raw results use images converted to TIFF



With a new image sensor and the Bionz X processor, the A6000 is a formidable CSC

CSC Body only: £519 / $649 > www.sony.com

Two into one

What do you get if you cross the A7R with the NEX-6? **Amy Davies** sees if the Sony Alpha 6000 has the best of both worlds

> THE SPECS

Sensor	24.3 million APS-C (23.5 x 15.6mm) CMOS sensor
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	Electronic viewfinder, 0.39 inches, 1,440,000 dots
Video	1080p
ISO range	100 to 25,600
Autofocus points	Hybrid autofocussing, 179 phase detection points, 25 contrast detect points
Max burst rate	11fps
Screen	Three-inch, 921k-dot tilting LCD
Shutter speeds	1/4000 – 30 seconds plus Bulb
Weight	344g (with battery and memory card)
Dimensions	120 x 66.9 x 45.1mm
Power supply	NP-FW50 rechargeable lithium-ion battery

With the launch of the Alpha 6000, Sony has introduced what amounts to an APS-C version of the full-frame Alpha 7. At the same time, two old NEX lines, the NEX-7 and the NEX-6, have been discontinued. Sony expects the NEX-7 owner to upgrade to the A7 range, while the A6000 is designed to meet the needs of the NEX-6 owner, sitting at the top of the company's APS-C enthusiast line.

Small and sleek, the A6000 has a similar look and feel to the A7. It features a newly designed 24.3-million-pixel APS-C CMOS sensor. It competes pretty closely with the likes of the Fujifilm X-E2, the Olympus OM-D E-M1 and the Panasonic Lumix G6.

FEATURES

Along with the new sensor, the A6000 is equipped with the Bionz X, Sony's latest processor, which is also found in the newest full-frames like the A7, the A7R and the A7S. Sony claims that the Bionz X is three times faster than the previous generation. The image sensor has 179 phase-detection autofocus points. There are also 25 contrast-detection AF points for the hybrid autofocussing system. At the time of launch, Sony claimed that the camera had the fastest AF in the world among cameras with an APS-C sized sensor.



Sony's 16-70mm f/4 lens is a powerful partner for the Alpha 6000

On the back of the A6000 is a tiltable LCD screen, which is joined by an electronic viewfinder: the same 0.39-inch, 1.4-million dot device found on the RX10 premium bridge camera.

Reflecting the broader trend, the A6000 comes complete with built-in Wi-Fi and NFC. Like several other Sony cameras, it is customisable with apps downloadable from Sony's cloud-based photo storage service PlayMemories (**www.sony.net/Products/playmemories**).

As its standard kit lens choice, the A6000 comes with a 16-50mm f/3.5-5.6 power zoom – the same lens that is packaged with the A5000. You can also buy it body only, giving yourself the freedom to choose from the large range of different E-mount lenses now available. Perhaps the perfect all-round lens for this camera is the Zeiss 16-70mm f/4 optic, but that comes with a £799 price tag – quite a bit more than the camera itself.

Meet the rivals...

See how the Sony A6000 stacks up against the competition



Fujifilm X-T1
Body only: £949 / $1,200
The X-T1 is not only beautiful, but it's capable of producing some truly superb images.
Reviewed: page 16
★★★★★



Panasonic GX7
Body only: £499 / $698
An ideal choice for experienced photographers looking for a smaller alternative to their SLR.
Reviewed: issue 144
★★★★★

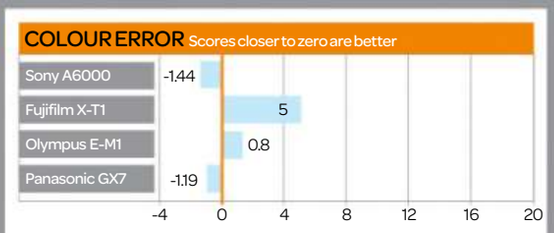


Olympus OM-D E-M1
Body only: £949 / $1,299
A superb camera, but it is quite complex and it takes some time getting to know.
Reviewed: page 16
★★★★★

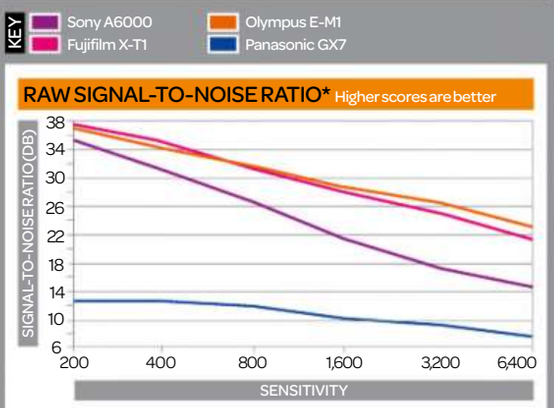


WHAT'S THIS? Find out how we test on page 6

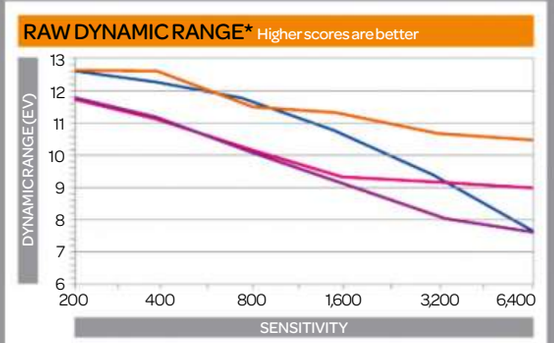
CAMERA BENCHMARKS
How does the Sony A6000 measure up?



COLOUR ERROR RESULT: The A6000 strikes a good balance between accurate colours and pleasing warm tones.



NOISE RESULT: Technically, the A6000 is the worst performer, but Sony is prioritising detail reproduction of noise reduction.



DYNAMIC RESULT: Both the A6000 and the X-T1 put in a similar performance, which is a reflection of their warm tones.

OVERALL BENCHMARK RESULT
A good consistent performance is put in by the A6000, and while it's not technically the best performer in the group, both signal-to-noise ratio and dynamic range results are pleasing, especially for JPEG images.

* Raw results use images converted to TIFF

BUILD AND HANDLING
Those who appreciate lots of dials and buttons will enjoy the A6000. It has plenty of controls available, and, like other Sony cameras, pretty much all of them are customisable to help you adjust the camera to suit the way you take photos.

The grip of the A6000 is ever so slightly more pronounced than on the NEX-6, making it easier to hold. There's also a nice texture covering the camera. On top of the camera are two dials: one for controlling the shooting mode (such as automatic, semi-automatic or manual), and another for altering the shutter speed or aperture, depending on the mode you're shooting in.

Setting the autofocus point on this camera is a task that would be speedier with a touchscreen, but it's not too bad if you set the right custom buttons. To make things quicker, set Focus Area to Flexible Spot. From here, you simply need to press the button in the centre of the scrolling dial on the back of the camera to bring up the focus point selection option. You can then use the directional keys to move around the screen. It's worth noting that this is the default option for the central button when Flexible Spot is selected: if you've got it set to anything else, it won't work in the same way.

Although it's not a touchscreen, the screen tilts, which is useful for shooting from some awkward angles, or for shielding the screen from glare. The viewfinder is bright and clear, and doesn't seem to suffer from any noticeable lag. Setting up Wi-Fi is quick and easy, and makes the A6000 convenient for quickly sharing photos to your smartphone or tablet.

Above The 24.3-million-pixel sensor of the A6000 is capable of resolving a great amount of fine detail

> "Those who appreciate dials and buttons will enjoy the A6000. It has plenty of controls available"

PERFORMANCE
Sony is producing some of the most interesting compact system cameras currently on the market and, pleasingly, the A6000 is another great performer to add to the line-up. Its images are great, with beautifully saturated colours. You can experiment with how JPEGs look straight from the camera by adjusting

Zooming in on the... Sony A6000

A quick tour of the camera's key features



A sensor in the A6000's eyepiece detects when the camera is lifted to the eye

This dial controls different functions depending on the shooting mode, like altering the aperture

Press this button to raise the flash. You can also add an external flash via the hotshoe

Tilting downwards and upwards, the screen is useful for shooting from awkward angles

This customisable button can be set to a specific function of your choosing – such as sensitivity

Press the function button to access commonly used settings, such as white balance

Creative Styles – a number of which are available as pre-stored settings.

Detail is rendered very well by the A6000. Generally, image smoothing only starts to become problematic for normal printing sizes in shots taken at around ISO 3,200 upwards. Examining images at 100% from around ISO 1,600 upwards, you will find areas of the image that have a painterly effect, but the overall effect is good.

> "Sony has come within touching distance of creating the perfect compact system camera"

The camera's metering system does a good job with exposure, although it sometimes struggles in high-contrast situations, when you'll need to dial in some exposure compensation. Similarly, the automatic white balance system is a good performer, although it can be slightly confused by some artificial light sources.

In good light, autofocussing speeds are very quick, dropping as the light levels drop, but only struggling to lock on at all in very dark conditions.

The 16-50mm f/3.5-5.6 kit lens is a good all-rounder to get started with, but this is the kind of camera you'll want to buy additional lenses for. Luckily there are some great ones for the E-mount.

Battery life is better than in the A7, probably due to the smaller sensor, but it's still worth buying a spare battery if you travel.



Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★★★
IMAGE QUALITY	**VALUE**
★★★★★	★★★★★

Overall ★★★★★

WE SAY: Sony has come within touching distance of creating the perfect CSC. Fantastic image quality and customisable buttons are great to have, but a couple of niggles keep it from greatness.

N Photo
100% NIKON 100% INDEPENDENT

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> THE SPECS	
Sensor	24.3MP APS-C format (23.5 x 15.6mm) Exmor CMOS
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC and Sony Memory Stick
Viewfinder	Electronic viewfinder with 2,359,296 dots (100% cover)
Video	Full HD (1,920 x 1,080) at 60p
ISO range	100 to 25,600; expandable to ISO 50-25,600 for stills, ISO 100-12,800 for movies
Autofocus points	Phase-detection with 79 points (15 cross-type)
Max burst rate	12fps (aperture locked at start)
Screen	3.2-inch, 1,229k-dot TFT
Weight	647g (body only)
Dimensions	142.6 x 104.2 x 80.9mm

SLT Sony Alpha 77 II > Body only: £764 / $998 > www.sony.com

Round two

Sony's enthusiast-level Alpha 77 II gets a speed boost as well as better image quality. **Angela Nicholson** checks it out

After the announcement of the full-frame E-mount Sony A7, A7R and A7S compact system cameras and the demise of the NEX brand, you could be forgiven for thinking that Sony might not continue with its A-mount SLT (single lens translucent) cameras. However, the arrival of the Sony Alpha 77 II indicates that this isn't the case.

As you might guess, the Alpha 77 II replaces the Alpha 77, which is now discontinued, and it has an almost identical shape and design. As before, the new camera is aimed at enthusiast photographers who want a step up from an entry-level model. It sits under the full-frame Alpha 99 in Sony's SLT line-up.

FEATURES

Like the Alpha 77, the A77 II has a 24-million-pixel sensor, but this is a new device that benefits from the progress that has been made with sensor design in the two-and-half years since the A77 first arrived. Also, for the first time in an A-mount camera, the sensor signal is processed by a Bionz X engine. This has given Sony the confidence to allow sensitivity to be set in the native range ISO 100-25,600 for still images, with a low expansion setting of ISO 50 also available.

One of the benefits of the SLT design is that there can be full-time phase-detection autofocus during movie shooting and when composing images on the rear screen. Sony has used a newly developed phase-detection sensor with 79 AF points (15 of which are the more sensitive cross-type) in the Alpha 77 II. Sensor development means that the A77 II's CCD AF sensor produces less electronic noise than previous devices and this helps with autofocusing speed and accuracy, as well as boosting low-light performance.



Above This tilting 3.2-inch screen displays a superb level of detail.

Spot AF performance is also claimed to have been improved, with weighting given to the centre of the spot. There's a collection of AF-point selection options including Wide, Zone, Flexible Spot, Local, Expanded Flexible Spot and Lock-on AF. In Expanded Flexible Spot mode, you select one AF point and the camera supports this with the surrounding eight points, which is useful when shooting a moving subject.

It's also possible to adjust the AF tracking duration across five levels via the menu. The low settings are useful when the subject distance isn't expected to change quickly, while high levels suit shooting subjects at different distances. In addition, a new AF Range Control option allows you



Stick or twist? Upgrade advice

Sony is proud of the progress it has made with the autofocusing system for the A77 II. We're told that five engineers conducted field tests for six months with rival high-end cameras like the Canon EOS 1DX, the Canon 70D, the Nikon D4, the Nikon D7100 and the Panasonic GH3, in order to find the best parameters for AF while shooting a variety of sports and action. The new system has 79 AF points, whereas the original A77 (pictured) has just 19 AF points, of which 11 are cross-type.

Zooming in on the... Sony Alpha 77 II

Sony's made important changes from the A77



The mode dial has been updated with a lock button to prevent it from being knocked out of position.



Strangely, Sony has continued with having the 12fps shooting option located on the mode dial.





The hotshoe has changed from the Sony (Minolta) proprietary shape to the more common universal style. It also has contacts for a wide range of accessories.



This controller makes it quick and easy to select the desired autofocus point in your scene.

The vari-angle mechanism on the rear LCD screen seems a little over-complicated.



As SLTs have a fixed translucent mirror, the A77 II has an electronic rather than optical viewfinder.



to restrict the AF to working within a specific distance range – useful when there are objects between the camera and the subject.

According to Sony, almost all of its A-mount lenses are compatible with the 79 AF points, although only 61 are available when you're shooting at 12fps. Sony's 500mm f/8 lens is a notable, but not surprising, exception: it will allow only the centre AF point to be used.

As suggested above, the A77 II can shoot a maximum rate of 12 frames per second with AF tracking, and the buffer has capacity to allow up to 25 raw and JPEG images to be captured in a single burst, but aperture is locked at the start of the sequence.

> "Almost all of Sony's A-mount lenses are compatible with the A77 II's 79 AF points"

Other pleasing additions to the A77 II's featureset include an HDMI port, which can supply clean video output to external storage devices, and Wi-Fi connectivity. As the A77 II has an NFC chip, owners of NFC-enabled smartphones and tablets can connect to the camera by touching the two devices together. Interestingly, despite the presence of Wi-Fi connectivity, the A77 II cannot make use of Sony's PlayMemories Camera apps.

BUILD AND HANDLING

Sony has given the Alpha 77 II the same tough feel, overall shape and control layout as the A77, and the vertical grip that was produced for the original model can be used with the new camera. There are a few differences, however: there are 27 features that can be assigned to one of the 12 slots in the Function menu, for example. It's also possible to customise the function of many of the buttons, but the default settings work well.

If you like using Picture Effects (Toy Camera, Pop Color, Posterization, Retro Photo, Soft High-key, Partial Color, High Contrast Mono, Soft Focus, HDR Painting, Rich-tone Monochrome, Miniature, Watercolor and Illustration are provided), it's worth assigning this and image quality to the Function menu so that you can quickly turn off raw recording

Meet the rivals...

There's a choice of SLRs and CSCs at this price point



Canon EOS 70D
Price £734 / $999
This 20.2MP SLR has a responsive vari-angle touchscreen, and captures great images.
Reviewed: issue 144
★★★★★

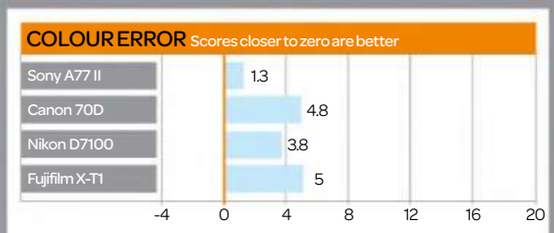


Nikon D7100
Price £731 / $897
A 24.1MP SLR with superb resolving power and an excellent AF system, but limiting buffer capacity.
Reviewed: issue 138
★★★★½



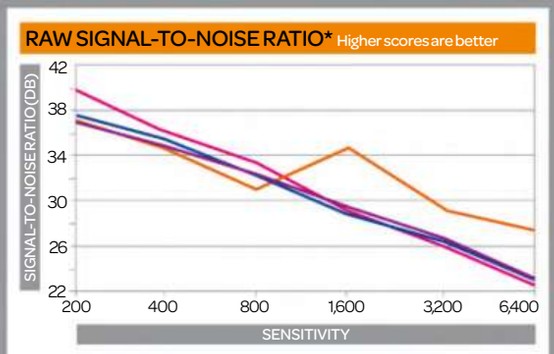
Fujifilm X-T1
Price £879 / $1,299
This SLR-style CSC has an excellent electronic viewfinder and traditional exposure controls.
Reviewed: page 16
★★★★★

CAMERA BENCHMARKS
How does the Sony Alpha 77 II measure up?

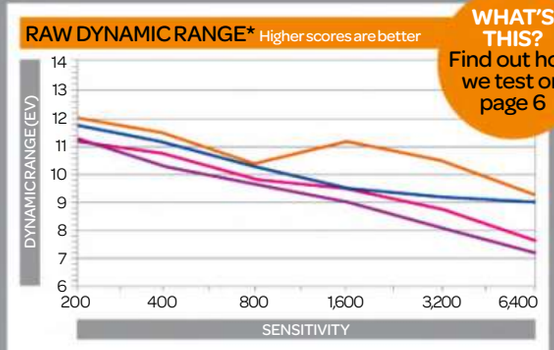


COLOUR ERROR RESULT: Our tests show that the Alpha 77 II is comfortably the most accurate camera in this group.

KEY: Sony A77 II, Canon 70D, Nikon D7100, Fujifilm X-T1



NOISE RESULT: The A77 II is one of the lower performing cameras here, but as with the JPEG images, this may be to reveal more detail.



WHAT'S THIS? Find out how we test on page 6

DYNAMIC RESULT: The Sony Alpha 77 II's raw file dynamic range lags behind competing cameras through most of its sensitivity range.

OVERALL BENCHMARK RESULT
It may not have the best performance in the lab tests, but the A77 II produces high-quality images. We suspect that the signal-to-noise ratio has been limited a little to allow more detail to be visible. However, the lower dynamic range indicates that highlights may burn out slightly earlier than with the competing cameras.

* Raw results use images converted to TIFF



Above Noise is controlled well in this ISO 25,600 raw image.

and access the effects. As with other Sony cameras, the Creative Style options (Standard, Vivid, Neutral, Clear, Deep, Light, Portrait, Landscape, Sunset, Night, Autumn, Black & White and Sepia), which give JPEG images a particular appearance, can be used when shooting raw images simultaneously.

While the three-inch 1,229k-dot vari-angle screen is useful for composing images from awkward angles, the articulating hinge seems unnecessarily complicated, and it takes a while to get used to its quirks and limitations. The hinges on cameras such as the Canon 70D and Nikon D5300 are much more straightforward.

As on the Sony A7 and 7R, the 2.3-million-dot electronic viewfinder (EVF) is bright and clear, with plenty of detail visible. As usual with an EVF, this brings the benefit of seeing the image as it will be captured. However, when the brightness is set to Automatic rather than manual, the extra gain applied in dark conditions can mean that the viewfinder image looks significantly brighter than the final image, so it's best to set the brightness to Manual.

> "The articulating hinge seems unnecessarily complicated, and it takes a while to get used to it"

PERFORMANCE
Even at the highest selectable sensitivity setting of ISO 25,600, noise is controlled well in raw files, having a fine texture with no banding or clumping visible at 100% on-screen. With careful processing, it's possible to conceal most of the coloured speckling in raw files and produce an image with just luminance noise giving some grain. Simultaneously captured JPEG files look softer than their raw counterparts, and close examination reveals a painterly texture with slightly sharpened edges. They generally look acceptable viewed at A3 size, but we prefer the slightly sharper, grainer look of the raw files.

As you'd hope with a 24MP sensor, the A77 II is capable of



recording a high level of detail at the lower sensitivity settings. While the A77 II's AF system struggled a little more than the Canon 5D Mark III in the low, flat light of an unlit music gig, there were no such problems with a fast-moving subject in good light. It was positive, fast and accurate. In continuous AF mode with AF selection set to Expanded Flexible Spot, it got rowers sharp in a flash and was able to keep them sharp by using the surrounding points when panning.

Above Using the Landscape Creative Style boosts blues and greens.



Left The Alpha 77 II has the same shape as the A77 camera it replaces.

When AF selection was set to Lock-on AF: Flexible Spot or Lock-on AF: Expanded Flexible Spot, it also tracked them around the frame if the original AF point wasn't kept in the correct location.

As usual, AF performance varies according to the lens that's mounted, and a good optic is required to get the best from the Alpha 77 II. It performs very well with the 70-200mm f/2.8, for example, but is a little more hesitant in low light with the 85mm f/2.8 – which also has a much noisier focus mechanism.

We used the Multi-segment metering system almost exclusively during this test. Although we shot in a wide range of conditions, there were only a few when a little exposure compensation was required.

Colours are also good straight from the camera, and the white balance system general does a good job when set to the Automatic setting.

VERDICT

While the changes made to the Alpha 77 II may not seem dramatic, Sony has worked on the most important aspects – the sensor and processor – to boost speed and image quality, as well as the autofocus performance. Many will recognise that it's sensible to stick with the same pixel count as with the Alpha 77: 24 million pixels capture enough detail for most purposes and allow big prints to be made. The files are large without being unmanageable by the average modern computer.

The AF system improvements and the A77 II's ability to control noise at high sensitivity levels, combined with the general high quality of the images, makes it a versatile camera that will be attractive to enthusiast photographers who want to shoot a wide range of subjects in a variety of conditions.

Digital Camera

FEATURES	BUILD QUALITY
★★★★☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★★★☆

Overall ★★★★☆

WE SAY: The A77 II's image quality is excellent, even at high sensitivity settings, and the autofocus system is fast and accurate. It's a great choice for enthusiasts who want versatility from their camera.



> THE SPECS	
Sensor	12.2MP full-frame (35.6 x 23.8mm) Exmor CMOS
Focal length conversion	1x
Memory	SD/SDHC/SDXC and Sony Memory Stick
Viewfinder	OLED electronic viewfinder with 2,359,296 dots (100% cover)
Video	Full HD (1,920 x 1,080p); 4K to an external recorder
ISO range	100 to 102,400; expandable to ISO 50-409,600 for stills
Autofocus points	Contrast-detection system with 25 points
Max burst rate	5fps
Screen	Tilting three-inch, 921k-dot TFT
Shutter speeds	1/8,000-30 sec, Bulb
Weight	446g (body only)
Dimensions	126.9 x 94.4 x 48.2mm
Power supply	NP-FW50 W-series

CSC Sony Alpha 7S > Body £1,699 / $2,499 > www.sony.com

Small sensation

Sony's most expensive Alpha 7-series CSC has the family's lowest resolution to date. **Angela Nicholson** gets the low-down

Sony now has three full-frame compact system cameras, giving you a choice depending upon what is most important to you. Those wanting the ultimate in detail resolution have the 36MP Alpha 7R, while photographers for whom low-light capability and video are of paramount importance should go for the 12MP A7S. The middle ground is occupied by the 24MP A7, which is capable of recording lots of detail, but has faster responses than the A7R.

FEATURES

Like the A7 and A7R, the A7S has the Sony E-mount, but its full-frame Exmor CMOS sensor has 12.2 million effective pixels and a native sensitivity range of ISO 100-102,400. This can be expanded for stills and video up to ISO 409,600, a figure matched only by the Nikon D4S.

Sony has also packed a lot of video technology into the A7S, including the ability to record 4K video to an external device connected via HDMI.

BUILD AND HANDLING

Sony's Alpha 7-series of (CSC) sets a new benchmark for size. Apart from a slightly more bulbous grip, the A7S is similar in size to the Olympus OM-D E-M5, which has a smaller sensor.

Above It may be small, but the A7S feels solidly made.

Thanks to its magnesium alloy body, the A7S feels solid in the hand. All the dials have a knurled edge to give them greater purchase, and the small control buttons that scatter the surface of the body have a quality feel. It's also exceptionally comfortable to carry and use for long periods.

As on the A7 and A7R, the OLED electronic viewfinder provides a superb view with plenty of detail and colours. Exposure can be seen changing as adjustments are made, so you usually know what you're going to get before you shoot.

The 3-inch 921k-dot tilting LCD also provides a clear view, but the Sunny Weather setting is a must in daylight on a UK summer's day, even if the sun is behind a cloud.

PERFORMANCE

While its lower pixel count means that the Alpha 7S can't resolve nearly

Meet the rivals...

Competing cameras that tackle different facets of the Alpha 7S



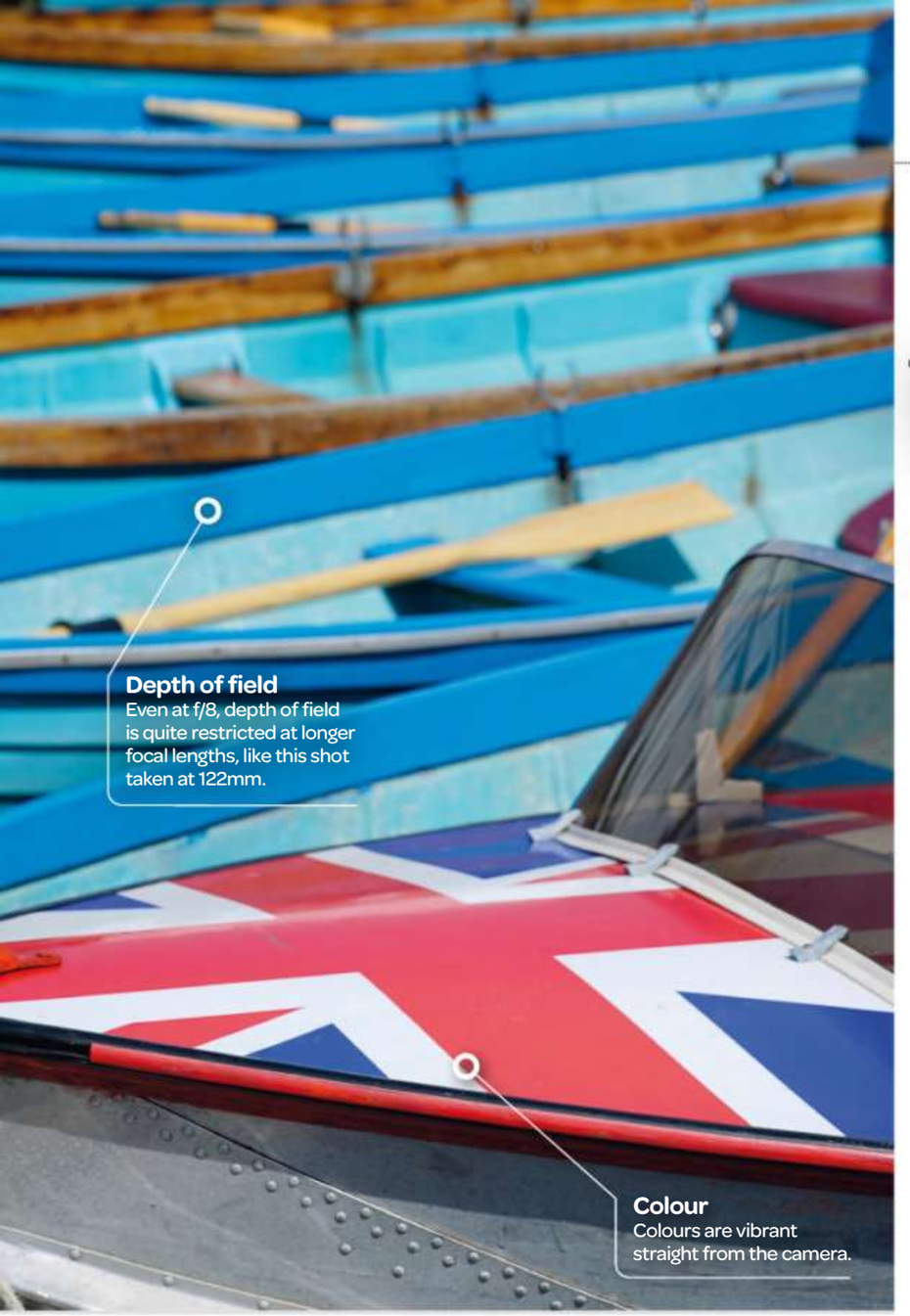
Sony Alpha 7
£819 / $1,199
The same build as the A7S, but with a 24MP sensor and a hybrid AF system for faster focusing.
Reviewed: issue 147



Nikon D4S
£4,449 / $5,997
Nikon's flagship SLR has a 16MP full-frame sensor and a top sensitivity setting of ISO 409,600.
Reviewed: page 28



Panasonic GH4
£1,049 / $1,498
It has a 16MP Four Thirds sensor, a touch-sensitive tilting screen and the ability to record 4K video.
Reviewed: page 18





Above That grip makes the A7S comfortable to hold.

WHAT'S THIS? Find out how we test on page 6

as much detail as either the Alpha 7 or 7R, or the 16MP Nikon D4S, images look sharp and make high-quality A3 prints. Images are generally well-exposed, but the brightness of the subject under the active AF point can skew the exposure a little when using the Multi-segment metering.

Noise is also controlled well. Although we wouldn't recommend using ISO 409,600 unless you really have to, the results from the A7S look better than from the Nikon D4S.

While it wouldn't be our first choice for shooting sport, the A7S's AF system can lock onto and track moving subjects in good light. It also manages to focus the lens automatically in low-light conditions, but it's slower than a comparably priced SLR.

We have found before that the A7-series of cameras tends to gobble through battery power. The A7S is the same, with only around 360 shots possible on a single charge.

VERDICT

The A7S could be a good choice for videographers building a rig around a small camera, or wedding photographers who rarely need to produce prints over A3 size.

Digital Camera

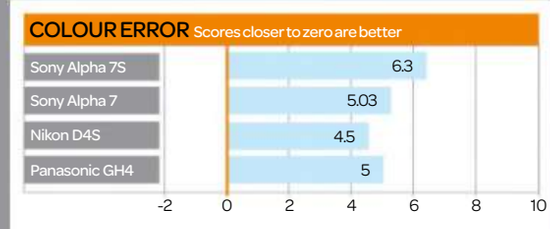
FEATURES	BUILD QUALITY
★★★★☆	★★★★☆
IMAGE QUALITY	**VALUE**
★★★★☆	★★★☆☆

Overall ★★★★☆

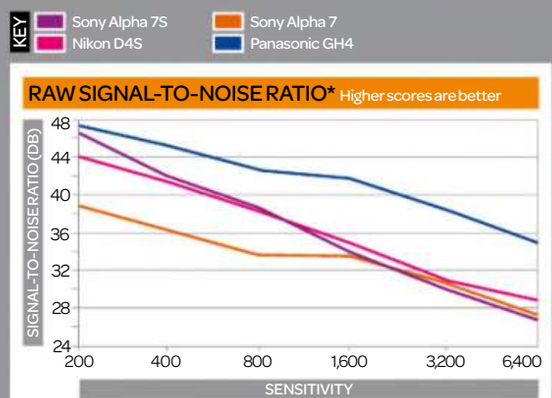
WE SAY: It's a great camera, but its low pixel count and high price relative to the A7 and A7R mean it's only likely to find favour with those who need to shoot in near-dark conditions or want extra control over video.

CAMERA BENCHMARKS

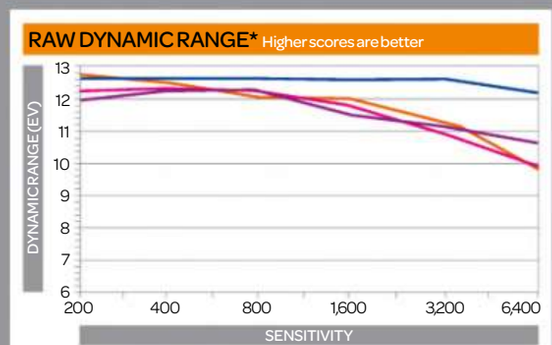
How does the Alpha 7S fare aginst its rivals?



COLOUR ERROR RESULT: Colours are on the well-saturated side technically, but they look good straight from the camera.



NOISE RESULT: Although the Panasonic GH4 leads the way for the majority of its sensitivity range, this doesn't extend as far as the A7S's.



DYNAMIC RESULT: The A7S beats the Nikon D4S at higher sensitivity values, indicating it can capture a wider range of tones in a single shot.

OVERALL BENCHMARK RESULT

Our tests show that there is some benefit to having larger photo receptors, but the Alpha 7S doesn't have it all its own way. The Panasonic GH4 in particular offers stiff competition, although its sensitivity range doesn't extend as high as the A7S.

* Raw results use images converted to TIFF

LENSES & ACCESSORIES

A camera is just a starting point in photography; a new lens or software package can help you take another step

There are lots of lenses and accessories that will help you get even more from your camera. For a start, you'll need a bag to carry your kit in and keep it safe, plus a tripod to keep your camera steady. A superzoom lens could also be a good investment, letting you shoot an enormous range of subjects including stunning landscapes, attractive portraits and distance sport or wildlife – all with one lens.

You'll also need some software to help you get images looking just as you want them, whether it's perfecting the colours, making a black-and-white conversion or finessing the composition with a panoramic crop. Read our group tests in this section to find the accessories that suit you and your photography.



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144

LENSES GROUP TEST

Best superzoom lens 132
Canon EF-S 18-200mm f/3.5-5.6 IS, Nikon AF-S DX 18-300mm f/3.5-6.3G ED VR, Olympus M.Zuiko Digital ED 14-150mm f/4-5.6 II, Panasonic Lumix G 14-140mm f/3.5-5.6 ASPH Power OIS, Sigma 18-200mm f/3.5-6.3 DC Macro OS HSM | C, Sigma 18-300mm f/3.5-6.3 DC Macro OS HSM | C, Tamron 14-150mm f/3.5-5.8 Di III, Tamron 16-300mm f/3.5-6.3 Di II VC PZD Macro

ACCESSORIES

Best image editing software 144
Adobe Photoshop CC 2015, Adobe Photoshop Elements 13, Adobe Photoshop Lightroom 6, Corel PaintShop Pro X7, CyberLink PhotoDirector 6, DxO OpticsPro 10, Phase One Capture One Pro 8, Serif PhotoPlus X7

Best shoulder bags 156
Billingham 307, Domke Chronicle, Jill-e Jack Camera Messenger Manfrotto Pro Shoulder Bag 20, Oberwerth München Think Tank Retrospective 40

Best travel tripods 158
Benro Travel Angel FTA18CC, Manfrotto Befree MKBFRC4-BH Mefoto GlobeTrotter, Nest Traveller NT-6264CK Vanguard VEO 265CB, Velbon UT-53D

Best Monopods 160
Manfrotto 685B Neotec, Manfrotto 560B-1 Rollei Mogopod 1, Sirui P-324SVanguard Veo AM-264TR, Velbon Pole Pod II



160



158





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Superzoom lenses

Whether you're travelling near or far this summer, it's nice to travel light. **Matthew Richards** puts space-saving superzoom lenses to the test



THE CONTENDERS

1 Canon EF-S 18-200mm f/3.5-5.6 IS, £390 / $590
2 Nikon AF-S DX 18-300mm f/3.5-6.3G ED VR, £600 / $895
3 Olympus M.Zuiko Digital ED 14-150mm f/4-5.6 II, £550 / $840
4 Panasonic Lumix G 14-140mm f/3.5-5.6 ASPH Power OIS, £480 / $730
5 Sigma 18-200mm f/3.5-6.3 DC Macro OS HSM | C, £270 / $410
6 Sigma 18-300mm f/3.5-6.3 DC Macro OS HSM | C, £400 / $610
7 Tamron 14-150mm f/3.5-5.8 Di III, £340 / $520
8 Tamron 16-300mm f/3.5-6.3 Di II VC PZD Macro, £480 / $730

Photography can literally be a pain. If you're exploring a city, rambling around the countryside, or heading to the other side of the world, a weighty bag of cameras, lenses and accessories will soon have you feeling the strain. Wouldn't it be nice if you could get the advanced handling and image quality of a system camera, without the chore of lugging a big collection of kit around with you? That's where superzoom lenses come in. They aim to deliver standard and telephoto zoom capabilities in a single, space-saving package – but it's not just about keeping the size and weight of your gear to a minimum.

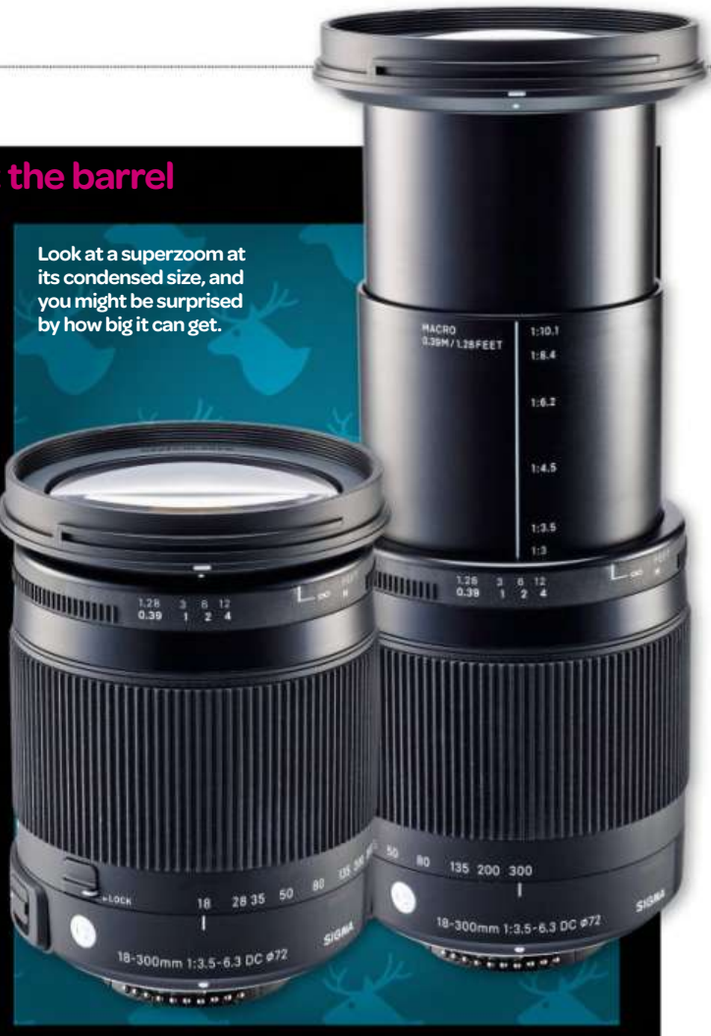
Superzooms have long been popular for their versatility. It's great being able to react quickly as shooting opportunities arise, zooming from wide-angle to telephoto and everything in between at the flick of a wrist. You'll avoid the frustration of missing shots altogether because you were too busy changing lenses. Another bonus for the digital age is that, without needing to swap lenses on the camera so often, you can greatly reduce the risk of dust and muck being dumped on the image sensor. It's especially true for compact system cameras, where the sensor is in plain sight when changing lenses, rather than being hidden away behind a mirror and shutter assembly.

Kit anatomy Roll out the barrel

We're all used to zoom lenses extending in length as you sweep through the zoom range. However, while extension is often minimal with wide-angle and standard zoom lenses, or non-existent with many constant-aperture zoom lenses, superzooms are a different story.

While all of the lenses in this group test are reasonably compact and manageable, to varying extents, they all extend greatly as you zoom from the shortest to the longest available focal length.

As a rule of thumb, you can expect a superzoom lens to double in length at its maximum telephoto setting. Add a lens hood as well (sold separately for the Canon and Nikon lenses on test) and the overall length can be more than you bargained for.



Look at a superzoom at its condensed size, and you might be surprised by how big it can get.

> "You'll avoid the frustration of missing shots altogether because you were too busy changing lenses"

SLIM AND TRIM

In the downsizing stakes for travel-friendliness, it naturally helps if the host camera is also reasonably compact and lightweight. The biggest competition among superzoom lenses is therefore in APS-C format SLRs, rather than their larger full-frame siblings, and in compact system cameras. The physically smaller image sensors usually fitted to today's CSCs enable lenses to be even tinier.

One reason for this is that the image circle the lens needs to produce is relatively small. The second is that the greater crop factor (for example 2.0x for Micro Four Thirds cameras instead of 1.5x or 1.6x for APS-C) means that the actual focal length range tends to be smaller. As a case in point, The Canon 18-200mm APS-C format lens and the Olympus 14-150mm MFT lens both give a similar effective zoom range, equating in 35mm terms to 28.8-320mm for the Canon and 28-300mm for the Olympus. However, while the Canon measures 79 x 102mm and weighs 595g, the Olympus is much smaller at 64 x 83mm and less than half the weight at 285g.

There's been some significant weight loss in APS-C format superzooms over the last few years as well. In our last group test of superzooms (*Digital Camera* 141), we featured the Nikon AF-S DX 18-300mm f/3.5-5.6G ED VR, which we criticised for its podgy proportions of 83 x 20mm and hefty weight of 830g. The newer Nikon AF-S DX 18–300mm f/3.5-6.3G ED VR is a third of a stop slower at the long end of its zoom range, but a much more manageable 79 x 99mm and 550g. A further indication is that

How we test lenses Advice you can trust

Our lens tests are based on a two-stage procedure. First, lab tests are carried out, shooting two test charts under controlled lighting conditions. The results are then processed using Imatest Master, so that we can quantify optical performance in terms of sharpness, chromatic aberrations and distortion. Overall quality is assessed at the centre, edge and corners of the images.

For real-world testing, we use each of the lenses under widely varying indoor and outdoor lighting conditions. Overall handling is checked, along with smoothness and precision of zoom and focus rings, and the operation of all switches. We also test the speed and accuracy of autofocus systems, complete with operation of full-time manual override where available. The effectiveness of optical stabilisation systems, where fitted, is checked by gradually reducing shutter speeds during handheld shooting. Ratings are finally given for features, build quality, image quality and value for money.

the filter thread shrinks from 77mm to 67mm. Even so, the 'slimmer of the year' award goes to Sigma, whose current 18-200mm and 18-250mm lenses (the latter not reviewed this time around) for APS-C format SLRs are much smaller than the original editions, tipping the scales at just 430g and 470g respectively. The 18-200mm featured in this group test measures just 71 x 86mm, so it's barely bigger than most standard zoom lenses for this class of SLR.

THE LONG AND THE SORT

Some superzoom lenses go all out for zoom range instead of trying to keep size and weight to a minimum. Sigma's latest offering is an 18-300mm lens that gives longer telephoto reach than any of its previous superzooms (not counting the enormous Sigma 50-500mm super-telephoto zoom). Size and weight creep up again to 79 x 102mm and 585g.

Tamron has a habit of eyeing up the biggest zoom range on the market – then trumping it. The company has struck again with its latest 16-300mm lens for Canon, Nikon and Sony APS-C format SLRs. As well as having a class-leading 18.75x zoom range, it gives greater wide-angle coverage than any other superzoom, with an effective shortest focal length of just 24mm (25.6mm in its Canon fit), whereas most superzooms are equivalent to 28mm at their shortest zoom setting.

Getting back to the long end of the zoom range, one perennial problem of telephoto shooting is camera-shake, especially for travel and walkabout shooting, where you may not want to be carrying a tripod around with you.

To combat this, all of the Canon-fit and Nikon-fit lenses featured in this group test have optical image stabilisation. Sigma and Tamron both omit the stabiliser from APS-C format superzooms in their Sony-fit option (also Pentax for Sigma), as the host cameras typically have sensor-shift stabilisation built in.

The same goes for Olympus Micro Four Thirds cameras, whereas Panasonic bodies often don't have built-in stabilisation. The Panasonic 14-140mm MFT lens on test here therefore includes a Power OIS (Optical Image Stabilizer).

EQUIPMENT KNOW-HOW

FEATURES TO LOOK FOR

Big up the versatility without going large on size

Zoom range
For a superzoom lens, it's tempting to go for the maximum possible zoom range, but you can often enjoy a reduction in size and weight if you sacrifice a little telephoto reach.

Focus distance scale
The Tamron 16–300mm lens has a focus distance scale beneath a viewing window. Both Sigmas have distance scales printed on their focus rings, but none of the others do.

MFT vs APS-C
Micro Four Thirds lenses in this group are typically smaller and lighter than APS-C format lenses. Check our comparison table (page 126) to see how all the lenses measure up.



Optical stabilisation
In this test group, optical image stabilisers are built into the Canon, Nikon, Panasonic, Sigma (not Pentax or Sony fitment) and the Tamron 16–300mm (not Sony fitment).

Aperture width
You won't be able to find a superzoom lens that offers particularly wide apertures. Most shrink from f/3.5 to f/5.6 or f/6.3 as you stretch through the zoom range.

Zoom lock switch
Apart from the Canon, all lenses on test are impressively resistant to zoom creep. The Canon, Nikon, Sigma and Tamron lenses have the added safety feature of zoom lock switches.

Explained Autofocus systems

The Canon 18–200mm has a basic electric AF motor, which is audible in operation. The Sigmas and Tamron 16-300mm have ultrasonic motor systems, which are quieter. The Nikon has ring-type ultrasonic autofocus which is quieter still, and the MFT lenses have virtually silent stepping motors. The focus ring rotates during autofocus in the Canon and both Sigma lenses. Unusually for a lens with an ultrasonic motor, the Tamron 16–300mm also enables full-time manual focus override. This is also available in the Nikon and the MFT lenses.



APS-C Canon EF



APS-C Nikon F

Canon EF-S 18-200mm f/3.5-5.6 IS £390 / $590

It's a hefty old beast

Despite being outgunned for zoom range by the newer Nikon and Sigma 18-300mm lenses, as well as the Tamron 16-300mm, the Canon is the outright heaviest lens in the group, and the joint biggest along with the Sigma.

Launched in 2008, the Canon looks and feels quite dated. There's no focus distance scale and autofocus is based on a simple and fairly noisy electric motor. Unlike Canon lenses that feature ring-type ultrasonic or stepping motor system (the latter adopted in the newer 18-135mm STM lens), the focus ring rotates during autofocus and there's no full-time manual override.

On the plus side, the lens features a late-generation image stabiliser that has a four-stop rating and comes complete with automatic panning and tripod detection. Two UD (Ultra-low Dispersion) elements are fitted to combat chromatic aberrations and Super-Spectra coatings are applied to reduce ghosting and flare. Overall build quality feels fairly robust, but the mount lacks a weather-seal ring. It also suffers badly from zoom creep.

PERFORMANCE

Autofocus is reasonably quick for an electric motor-driven system and, in our tests, the stabiliser gave a three-stop benefit. Sharpness is below average throughout the zoom range, but there's no major drop-off at the telephoto end. Barrel distortion at the wide-angle end is worse than all others apart from the Tamron 16-300mm, which gives a wider angle of view.



Tech focus...
16 elements in 12 groups; six diaphragm blades; closest focus distance, 45cm; 72mm filter thread; electric motor autofocus; 79 x 102mm; 595g.

Digital Camera

FEATURES	★★★☆☆
BUILD QUALITY	★★★☆☆
IMAGE QUALITY	★★★☆☆
VALUE	★★★☆☆
OVERALL	★★★☆☆

Nikon AF-S DX 18-300mm f/3.5-6.3G ED VR £600 / $895

Newer, smaller and simpler

There are currently two Nikon 18-300mm lenses on the market, this newer one having a narrower f/6.3 rather than f/5.6 aperture at the long end of the zoom range. It's also a lot more travel-friendly than the older lens, being smaller and nearly 300g lighter, at 550g.

Like most Nikon lenses, this one features a rubber weather-seal ring on its metal mounting plate. It beats the competing Canon lens by featuring ring-type ultrasonic autofocus, which is reasonably quick, very quiet and comes complete full-time manual override. As usual for this type of system, the focus ring doesn't rotate during autofocus. Switches are on hand for auto/manual focus, VR (Vibration Reduction) on and off and zoom lock.

We experienced four-stop effectiveness from the VR and, unlike the older Nikon 18-300mm and 18-200mm superzooms, there's no zoom creep. Even so, there's a budget look and feel to the lens, which lacks a focus distance scale and is supplied without a lens hood (sold separately).

PERFORMANCE

Despite featuring three ED (Extra-low Dispersion) elements, colour fringing is the second worst in the group. At least in-camera corrections take care of fringing in current and recent Nikon SLRs, when shooting in JPEG mode or processing raw files in Nikon's own software. Sharpness is good at wide to mid zoom settings but drops off a lot at the long end. Distortion levels are pretty average.



Tech focus...
16 elements in 12 groups; 7 diaphragm blades; closest focus distance, 48cm; 67mm filter thread; ultrasonic (ring type) autofocus; 79 x 99mm; 550g.

FEATURES	★★★★☆
BUILD QUALITY	★★★★☆
IMAGE QUALITY	★★★☆☆
VALUE	★★☆☆☆
OVERALL	★★★☆☆



Four Thirds Micro Four Thirds

Olympus M.Zuiko Digital ED 14-150mm f/4-5.6 II £550 / $840

Small, lightweight but powerful

Remarkably simple, the Olympus is the only lens in the test group that has no buttons or switches. There's not even one for locking the zoom mechanism, although this isn't a problem as there's no hint of zoom creep. There's no optical image stabiliser either, as it relies on in-camera stabilisation from Olympus Micro Four Thirds bodies. Finally, there's no auto/manual focus switch as this is taken care of by the host camera.

The stepping motor autofocus system is optimised for shooting both stills and movies. It's virtually silent, reasonably quick for stills and gives silky smooth transitions when shooting movies. Multi-coatings are applied to all lens elements to keep ghosting and flare to a minimum and, of the three aspherical elements, one is made from ED (Extra-low Dispersion) glass. Compact and lightweight at 64 x 83mm and 285g, the lens has a high-precision feel to its construction, complete with a weather-sealed mount and dust, splash and freeze-resistance.

PERFORMANCE

The Olympus beats the competing Panasonic MFT lens for sharpness at wide-angle and mid-zoom settings but drops off at the long end of the zoom range. Sharpness levels are below average, but colour fringing and distortions are complete non-issues on the OM-D E-M1 that we used for testing. For telephoto shooting, we found in-camera stabilisation gave a two-stop advantage, proving less effective than the Panasonic lens's optical stabiliser.



Tech focus...
15 elements in 11 groups; seven diaphragm blades; closest focus distance, 50cm; 58mm filter thread; stepping motor autofocus; 64 x 83mm; 285g.

Digital Camera

FEATURES	★★★☆☆
BUILD QUALITY	★★★★☆
IMAGE QUALITY	★★★★☆
VALUE	★★★☆☆
OVERALL	★★★☆☆



Four Thirds Micro Four Thirds

Panasonic Lumix G 14-140mm f/3.5-5.6 ASPH Power OIS £480 / $730

The shortest and lightest lens here

Weighing in at just 265g and measuring 75mm in length, this Panasonic lens is even lighter and smaller than the competing Olympus superzoom. It's also slightly shorter in maximum focal length, equivalent to 280mm instead of 300mm on Micro Four Thirds cameras, but adds optical stabilisation. Panasonic claims a 2x improvement in its Power vs Mega optical image stabilisation system, and it's certainly a big advantage over the Olympus and Tamron MFT lenses in the group, which have no optical stabilisation at all. The addition isn't just good news for owners of Panasonic cameras with no built-in stabilisation, as it gives the choice of whether to use optical or sensor-shift stabilisation on other MFT cameras.

Build quality feels almost as refined as in the Olympus lens but the Panasonic lacks weather seals. However, it features two ED elements where the Olympus only has one. The stepping motor autofocus system is similarly silent and suitable for stills and movie capture. Like the Olympus and Tamron MFT lenses here, manual focusing is an electronic 'fly-by-wire' affair.

PERFORMANCE

There's a dip in sharpness in the middle of the zoom range but it's pretty good at either end. Sharpness in handheld telephoto shots gets a boost from the optical stabiliser, which gives a benefit of about three and a half stops. Tests from our OM-D E-M1 revealed slightly more noticeable distortions than from the Olympus, but well controlled with minimal colour fringing.



Tech focus...
14 elements in 12 groups; seven diaphragm blades; closest focus distance, 30–50cm; 58mm filter thread; stepping motor autofocus; 67 x 75mm; 265g.

Digital Camera

FEATURES	★★★★☆
BUILD QUALITY	★★★★☆
IMAGE QUALITY	★★★☆☆
VALUE	★★★★☆
OVERALL	★★★★☆



APS-C | Canon EF | Nikon F | Pentax K | Sigma SA | Sony A

Sigma 18-200mm f/3.5-6.3 DC Macro OS HSM | C £270 / $410

A mere slip of a thing

Sacrificing a little in telephoto reach can pay dividends when you want to travel light. At 430g and 71 x 86mm, this lens is only about two-thirds of the weight of most 18-300mm APS-C format lenses. An exercise in downsizing, it's also 180g lighter and 14mm shorter than the first edition of Sigma's optically stabilised 18-200mm.

Part of this reduction is due to the introduction of double-sided aspherical lens elements and a downsized autofocus motor, while a new TSC (Thermally Stable Composite) material used in the lens barrels also plays a part. However, autofocus lacks full-time manual override, and the focus ring rotates while autofocusing. As the lens is quite compact, you need to be careful to keep your fingers clear of the focus ring when using autofocus.

The maximum telephoto reach is equivalent to a focal length of 300mm on Nikon, Pentax and Sony bodies, and 320mm on Canon cameras. That stacks up well against the MFT lenses in the group, which give an effective reach of between 280mm and 300mm.

PERFORMANCE

Helped by the inclusion of four SLD (Special Low Dispersion) elements, colour fringing is well controlled, beating most other APS-C format lenses. The optical stabiliser is pretty efficient as well, giving a benefit of about three-stops (Canon and Nikon fit versions). Sharpness is above average at the telephoto end and consistent through the whole zoom range.



Tech focus...
16 elements in 13 groups; seven diaphragm blades; closest focus distance, 39cm; 62mm filter thread; ultrasonic (motor) autofocus; 71 x 86mm; 430g.

Digital Camera

FEATURES ★★★★☆
BUILD QUALITY ★★★☆☆
IMAGE QUALITY ★★★★☆
VALUE ★★★★★
OVERALL ★★★★☆



APS-C | Canon EF | Nikon F | Pentax K | Sigma SA | Sony A

Sigma 18-300mm f/3.5-6.3 DC Macro OS HSM | C £400 / $610

A step up in size and quality

Compared with Sigma's 18-200mm lens that's also on test, this one is relatively big and heavy, at 79 x 102mm and 585g. Similar features include motor-driven rather than ring-type ultrasonic autofocus, with the same weaknesses of focus ring rotation during autofocus and the lack of full-time manual override.

Both lenses feature a focus distance scale printed on the focus ring, and a macro scale printed on the inner barrel which extends at longer zoom settings. The maximum macro magnification ratio is 0.33x but you can boost this to 0.5x by buying Sigma's optional close-up filter, developed exclusively for this lens. Neither of the Sigma lenses has a weather-sealed mount.

While the Sigma 18-200mm features four SLD elements, the 18-300mm upgrades to four top-quality FLD (Fluorite-level Low Dispersion) elements as well as one SLD element. A newer optical stabiliser (Canon and Nikon fit only) is also more efficient, with performance that's closer to four stops than three.

PERFORMANCE

Our tests reveal the new Sigma 18-300mm to be the sharpest lens here at wide-angle to mid-zoom settings, and it remains sharper than the competition at longer focal lengths between 150mm and 300mm (where available in other lenses). Colour fringing is well contained and distortions are less noticeable than in the Canon, Nikon and Tamron APS-C class lenses.



Tech focus...
17 elements in 13 groups; seven diaphragm blades; closest focus distance, 39cm; 72mm filter thread; ultrasonic (motor) autofocus; 79 x 102mm; 585g.

Digital Camera

FEATURES ★★★★☆
BUILD QUALITY ★★★☆☆
IMAGE QUALITY ★★★★★
VALUE ★★★★☆
OVERALL ★★★★☆



Four Thirds | Micro Four Thirds



APS-C | Canon EF | Nikon F | Sony A

Tamron 14-150mm f/3.5-5.8 Di III £340 / $520

First of the independents

Compared to APS-C and full-frame lenses for various makes of camera, independent lenses for the Micro Four Thirds format are thin on the ground. Indeed, the likes of Sigma, Samyang and Voigtlander only make prime lenses in MFT-fit. This Tamron 14-150mm is the only independently made MFT zoom lens currently available. It equals the Olympus's extended zoom range but lacks the Panasonic's optical image stabiliser. It's compact and lightweight at 64 x 80mm and 285g, although the filter thread is smaller at 52mm.

Build quality feels good with a smooth action to both zoom and focus rings, similar to the other MFT lenses on test. Again, there's no hint of zoom creep but the Tamron includes a zoom lock switch which is absent on both other MFT lenses. The metal mounting plate lacks the Olympus's weather-seal but the finish looks stylish. Inside, the construction includes two LD (Low Dispersion) and one XR (Extra Refractive Index) elements, along with the virtually silent stepping motor autofocus system.



Tech focus...
8 elements in 6 groups; 7 diaphragm blades; closest focus distance, 18cm; 49mm filter thread; autofocus driven from camera; 64 x 40mm; 189g.

PERFORMANCE

It's the least impressive lens in the whole group for sharpness at either end of the zoom range, although mid-zoom sharpness is marginally better than from the Panasonic MFT lens. Fringing is more noticeable than from either of the other MFT lenses, but there's less barrel distortion than from the Panasonic lens at the 14mm focal length.

Digital Camera

FEATURES ★★★☆☆
BUILD QUALITY ★★★☆☆
IMAGE QUALITY ★★★☆☆
VALUE ★★★☆☆
OVERALL ★★★☆☆

Tamron 16-300mm f/3.5-6.3 Di II VC PZD Macro £480 / $730

Comes top for zoom range

Pricier than the Canon and both Sigma lenses for APS-C format SLRs, the Tamron undercuts the Nikon, while beating them all in terms of outright zoom range. The Tamron offers a wider viewing angle at its shortest zoom setting than any other lens in the group. In full-frame terms, it has an effective focal length of 24mm in Nikon and Sony mount options, and 25.6mm in Canon-fit.

The lens feels robust but it's actually lighter than all the other APS-C lenses here, apart from the Sigma 18-200mm. Like the Nikon, it has a weather-seal ring on its mounting plate, and it's the only lens on test to feature a focus distance scale that's positioned beneath a viewing window. Switches are on hand for auto/manual focus and zoom lock, plus VC on/off (Canon and Nikon fit only). The Vibration Compensation stabilisation gave four-stop effectiveness in our tests. The PZD (Piezo Drive) autofocus is an ultrasonic motor-based design, but the focus ring doesn't rotate during autofocus, while also enabling full-time manual focus override.



Tech focus...
16 elements in 12 groups; seven diaphragm blades; closest focus distance, 39cm; 67mm filter thread; ultrasonic (motor) autofocus; 75 x 100mm; 540g.

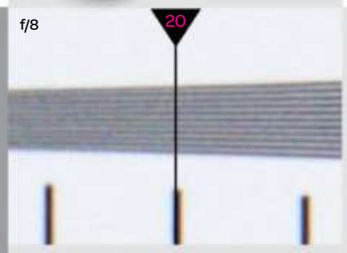
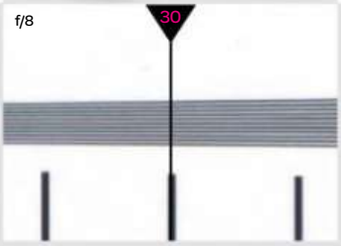
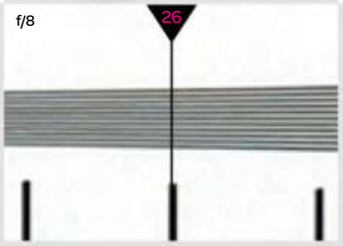
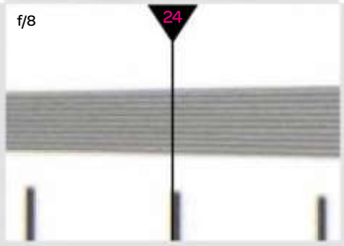
PERFORMANCE

A downside of the extra-wide viewing angle is that barrel distortion is worse at the minimum zoom length than in any other lens in the group, although it's only marginally worse than from the Canon and Nikon lenses. It has the highest levels of colour fringing of any lens in the group, while sharpness at any competing focal length is less impressive than from the Sigmas.

Digital Camera

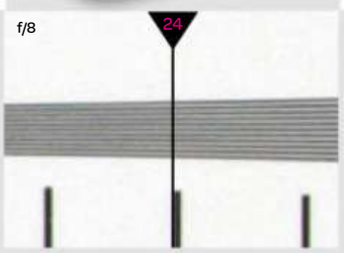
FEATURES ★★★★☆
BUILD QUALITY ★★★★☆
IMAGE QUALITY ★★★☆☆
VALUE ★★★★☆
OVERALL ★★★★☆

IMAGE QUALITY IN FOCUS

	CANON EF-S 18–200MM F/3.5–5.6 IS	NIKON AF-S DX 18–300MM F/3.5–6.3G ED VR	OLYMPUS M.ZUIKO DIGITAL ED 14–150MM F/4-5.6 II	PANASONIC LUMIX G 14–140MM F/3.5–5.6 ASPH POWER
				
SHARPNESS TEST				
	The Canon comes bottom of the group for sharpness at wide to mid-zoom settings, but there's no real drop-off at the long end.	There's plenty of sharpness throughout most of the zoom range but it drops off alarmingly as you approach the longest setting.	The Olympus holds its own pretty well for wide-angle and mid-zoom sharpness, but gradually drops away at long zoom settings.	Slightly less wide-angle sharpness than from the Olympus, and noticeably less at mid-zoom settings, but telephoto sharpness is good.
FRINGING TEST				
	Fringing is slightly better controlled at either end of the zoom range than in the Nikon 18-300mm and Tamron 16-300mm.	At either end of the zoom range, there's more colour fringing than with all other lenses in the group, apart from the Tamron 16–300mm.	There's practically no colour fringing at wide-angle settings and only very small amounts throughout the rest of the zoom range.	Colour fringing is very slightly more evident than from the Olympus at the wide-angle end, but there's practically none at the telephoto end.
DISTORTION TEST				
	Barrel distortion is worse than all bar the Tamron 16–300mm at the short end of the range. Pincushion is about average at longer settings.	Slightly less wide-angle barrel distortion than from the Canon 18–200mm, and very slightly more pincushion at longer zoom settings.	Distortion is basically a non-issue at any zoom setting. The Olympus is a clear winner in the test group in this respect.	It doesn't score quite as well as the Olympus for distortion, especially at the wide-angle end, but distortions are well controlled overall.
IMAGE TEST VERDICT	Considering this Canon lens's fairly modest zoom range, all the main aspects of image quality in our tests are a little disappointing.	The Nikon's image quality isn't particularly impressive, and is let down by a lack of telephoto sharpness and fairly high levels of colour fringing.	Impressive in all respects. Image quality only really suffers from a lack of sharpness at the long end of the zoom range.	Not quite as good as the Olympus lens for fringing and distortions, but sharpness at the long end of the zoom range is more impressive.
	★★★☆☆	★★★☆☆	★★★★☆	★★★☆☆

SIGMA 18–200MM F/3.5–6.3 DC MACRO OS HSM | C





Good levels of sharpness remain very consistent throughout the entire zoom range, even at the widest available apertures.



Lab scores for colour fringing on this Sigma lens are better on the whole than for other APS-C format lenses in the group.



There's less wide-angle barrel distortion than from any other APS-C format lens, whereas mid to long range pincushion is average.

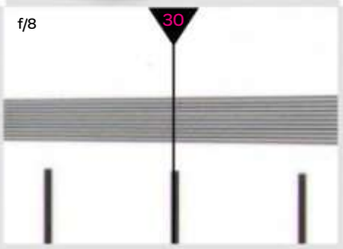
IMAGE TEST VERDICT

Image quality is very good overall, with consistent sharpness through the zoom and aperture ranges, along with restrained barrel distortion.

★★★★☆

SIGMA 18–300MM F/3.5–6.3 DC MACRO OS HSM | C





Sharpness levels are better than from any other lens here, at any given focal length, throughout the generous 18–300mm zoom range.



Colour fringing is better controlled than in the Nikon 18-300mm and Tamron 16-300mm lenses, and the Canon at mid-zoom settings.



The new Sigma 18–300mm delivers the most pleasing image quality of any lens in the entire group, despite its mighty zoom range.

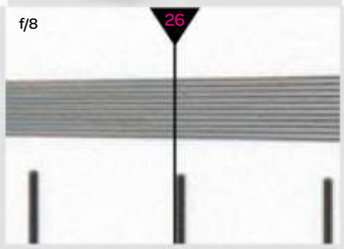
IMAGE TEST VERDICT

Overall, the new Sigma 18-300mm delivers the most pleasing image quality of any lens in the entire group, despite its mighty zoom range.

★★★★★

TAMRON 14–150MM F/3.5–5.8 DI III





At both ends of the zoom range, the levels of sharpness are less impressive than from any other lens on test.



Amounts of colour fringing are fairly well contained but performance in this respect lags behind the Olympus and Panasonic MFT lenses.



The lack of wide-angle and telephoto sharpness is disappointing and the Tamron doesn't score as highly as competing MFT lenses in other areas.

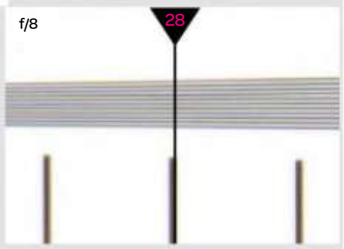
IMAGE TEST VERDICT

Image quality is very good in most respects, but the lack of sharpness towards the edges and corners of images spoils the party somewhat.

★★★☆☆

TAMRON 16–300MM F/3.5–6.3 DI II VC PZD MACRO





Compared with the competing Nikon and Sigma 18-300mm lenses, the Tamron has less wide-to-mid zoom sharpness.



Colour fringing is more pronounced than from any other lens in the group, especially at both ends of the zoom range.



Barrel distortion at the short end of the zoom range is worse than from any other lens, although the Tamron gives a wider angle of view.

IMAGE TEST VERDICT

The enormous zoom range with its extra-wide facility is great to have, but outright image quality drops off as a consequence.

★★★☆☆

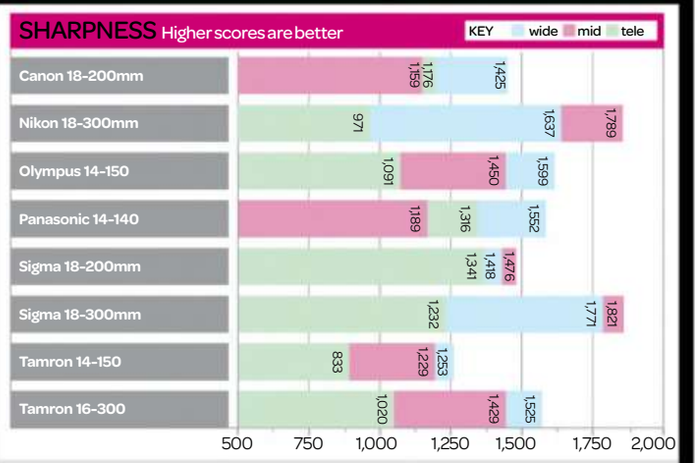
LENS BENCHMARKS

How the lenses fare in our lab tests

For our lab tests, we used a Canon 7D Mk II for the Canon and Sigma 18-200mm lenses, and a Nikon D7200 for the Nikon and Sigma 18-300mm lenses, and the Tamron 16-300mm. All three MFT lenses were tested on the same Olympus OM-D E-M1 body. Most lenses dropped in sharpness at the long end of their zoom range, apart from the Panasonic 14-140mm, for which sharpness levels dipped at mid-zoom settings, and the Sigma 18–200mm which maintained fairly even levels of sharpness throughout its zoom range. The Tamron 14-150mm MFT lens was least impressive for sharpness.

Low levels of colour fringing proved good in the Olympus and Panasonic lenses. The worst performers were the Nikon 18-300mm and Tamron 16-300mm lenses. The Olympus gave negligible amounts of distortion at any zoom setting, whereas other lenses gave varying degrees of barrel distortion at their shortest focal lengths, switching to fairly similar degrees of pincushion at mid to long zoom settings.

SHARPNESS Higher scores are better



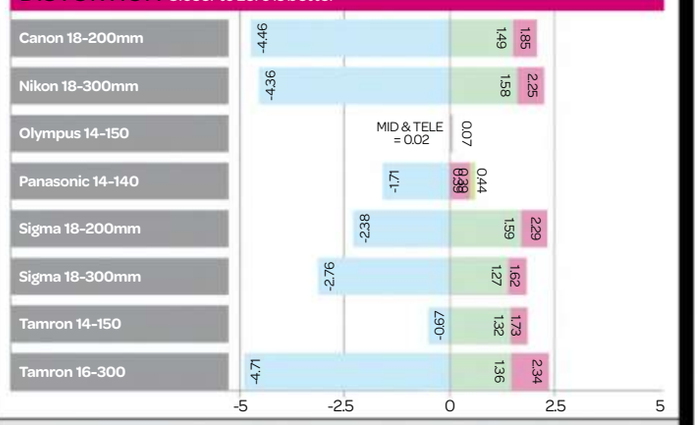
The Nikon and Sigma 18-300mm lead for sharpness in the short-to-mid part of the zoom range but the Sigma has better sharpness at the long end.

FRINGING Lower scores are better

	tele	mid	wide
Canon 18-200mm	2.54	1.52	1.94
Nikon 18-300mm	4.42	1.01	3.17
Olympus 14-150	0.88	0.67	0.14
Panasonic 14-140	0.54	0.45	0.94
Sigma 18-200mm	1.83	0.47	2.04
Sigma 18-300mm	1.64	0.58	2.87
Tamron 14-150	2.54	0.83	1.93
Tamron 16-300	5.6	1.56	5.6

The Olympus and Panasonic lenses boast the best results for colour fringing whereas the Nikon 18–300mm and Tamron 16–300mm fare the worst.

DISTORTION Closer to zero is better



Most lenses follow a similar path of barrel to pincushion distortion as you go through the zoom range, but the Olympus lens delivers negligible distortions.

HOW THE LENSES COMPARE



NAME	Canon EF-S 18-200mm f/3.5-5.6 IS	Nikon AF-S DX 18-300mm f/3.5-6.3G ED VR	Olympus M.Zuiko Digital ED 14-150mm f/4-5.6 II	Panasonic Lumix G 14-140mm f/3.5-5.6 ASPH Power OIS	Sigma 18-200mm f/3.5-6.3 DC Macro OS HSM \| C	Sigma 18-300mm f/3.5-6.3 DC Macro OS HSM \| C	Tamron 14-150mm f/3.5-5.8 Di III	Tamron 16-300mm f/3.5-6.3 Di II VC PZD Macro
Contact	www.canon.co.uk	www.nikon.co.uk	www.olympus.co.uk	www.panasonic.co.uk	www.sigma-imaging-uk.com		www.tamron.co.uk	www.tamron.co.uk
Street price	£390 / $590	£600 / $895	£550 / $840	£480 / $730	£270 / $410	£400 / $610	£340 / $520	£480 / $730
Sensor fit	APS-C	APS-C	Four Thirds	Four Thirds	APS-C	APS-C	Four Thirds	APS-C
Mount options	EF	F	MFT	MFT	EF F K SA A	EF F K SA A	MFT	EF F A
Autofocus motor	Electric motor	Ultrasonic (ring type)	Stepping motor	Stepping motor	Ultrasonic (motor)	Ultrasonic (motor)	Stepping motor	Ultrasonic (motor)
Dimensions (diameter x length)	79 x 102mm	79 x 99mm	64 x 83mm	67 x 75mm	71 x 86mm	79 x 102mm	63 x 40mm	75 x 100mm
Weight	595g	550g	285g	265g	430g	585g	285g	540g
FEATURES	★★★☆☆	★★★★☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
BUILD QUALITY	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★★☆
IMAGE QUALITY	★★★☆☆	★★★☆☆	★★★★☆	★★★☆☆	★★★★☆	★★★★★	★★★☆☆	★★★☆☆
VALUE	★★★☆☆	★★☆☆☆	★★★☆☆	★★★★☆	★★★★★	★★★★☆	★★★☆☆	★★★★☆
OVERALL	★★★☆☆	★★★☆☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★☆

KEY: EF Canon EF F Nikon F MFT Micro Four Thirds K Pentax K SA Sigma SA A Sony A



THE DIGITAL CAMERA VERDICT

SIGMA WINS FOR QUALITY

The best combination of image quality and zoom range

Sigma's new 18-300mm delivers a mighty 16.7x zoom range with deliver excellent sharpness and reasonably low amounts of distortion and colour fringing. It does rather better than the Tamron 16-300mm in all aspects of image quality. However, the Tamron is more refined in terms of handling, thanks to the way the focus ring doesn't rotate during autofocus and enables full-time manual override. The Tamron also has a weather-sealed mount that's lacking in the Sigma, as well as giving a wider angle of view at the short end of the zoom range. Overall, it's a close call but the Sigma edges ahead for outright image quality and price.

For outright value, Sigma wins again with the latest incarnation of its 18-200mm lens. The zoom range is less powerful but all-round quality is very impressive at such a low asking price — it's the cheapest lens in the group by quite a margin. We prefer Sigma lenses to the Canon 18-200mm and Nikon 18-300mm own-brand options. The Canon is dated and needs the same kind of refresh that the company's 18-135mm has benefitted from, while the Nikon lacks telephoto sharpness and is fairly poor value for money.

For Micro Four Thirds, the Panasonic 14-140mm gives best all-round image quality and boasts optical image stabilisation, but it's slightly down on telephoto reach compared to the Olympus and Tamron 14-150mm lenses.



1 SIGMA 18–300MM F/3.5-6.3 DC MACRO OS HSM | C

What's good: Powerful zoom range; excellent all-round image quality; effective stabiliser.

What's bad: Focus ring rotates during auto-focus; mounting plate lacks a weather-seal.

We say: It edges ahead for image quality.

★★★★☆

OUR TEST RESULTS

Discover our top five superzoom lenses



2 TAMRON 16-300MM F/3.5-6.3 DI II VC PZD MACRO

What's good: Extra-wide viewing angle at 16mm; good handling; weather-sealed mount.

What's bad: Loses out to the Sigma 18-300mm for sharpness, distortions and colour fringing.

We say: It adds extra wide-angle potential.

★★★★☆



3 SIGMA 18-200MM F/3.5-6.3 DC MACRO OS HSM | C

What's good: Very compact and lightweight for an APS-C format lens; strong performance.

What's bad: Relatively modest telephoto reach; focus ring rotates during autofocus.

We say: It's a highly impressive superzoom lens at a bargain price.

★★★★☆



4 PANASONIC LUMIX G 14-140MM F/3.5-5.6 ASPH POWER OIS

What's good: Small and lightweight build but with good performance and stabilisation.

What's bad: Less telephoto reach than the Olympus and Tamron 14-150mm lenses.

We say: The increase in image quality and added stabiliser makes this the best MFT buy.

★★★★☆



5 OLYMPUS M.ZUIKO DIGITAL ED 14-150MM F/4-5.6 II

What's good: Beautifully built with the inclusion of weather-seals; good image quality.

What's bad: No optical stabilisation; sharpness drops off at the telephoto end.

We say: It's a pretty good lens but the Panasonic is a better buy at its lower price.

★★★☆☆



Image editors

Which is the best tool to help you make your photos fulfil their potential? *Rod Lawton* finds out if there's life beyond Photoshop

THE ENTRY LIST

1 Adobe Photoshop CC 2015 £8.57 / $9.99 per month* www.adobe.com
Most would contend that Photoshop is the best image editor bar none, but it's now one of the best bargains too, thanks to its subscription plan.

2 Adobe Photoshop Elements 13 £81 / $100 www.adobe.com
Adobe's amateur-orientated image editor has a few new effects and a redesigned interface, but does it do enough to stay ahead of the rest?

3 Adobe Photoshop Lightroom 6 £8.78 / $9.99 per month* or £103 / $149 for permanent licence www.adobe.com
With Apple's Aperture on its way out, Lightroom is now the top pro image cataloging application, and Adobe's subs offer makes it even more tempting.

4 Corel PaintShop Pro X7 £60 / $80 www.corel.com
PaintShop Pro is one of the imaging industry's old-timers, so this latest version has some work to do to keep up with its rivals.

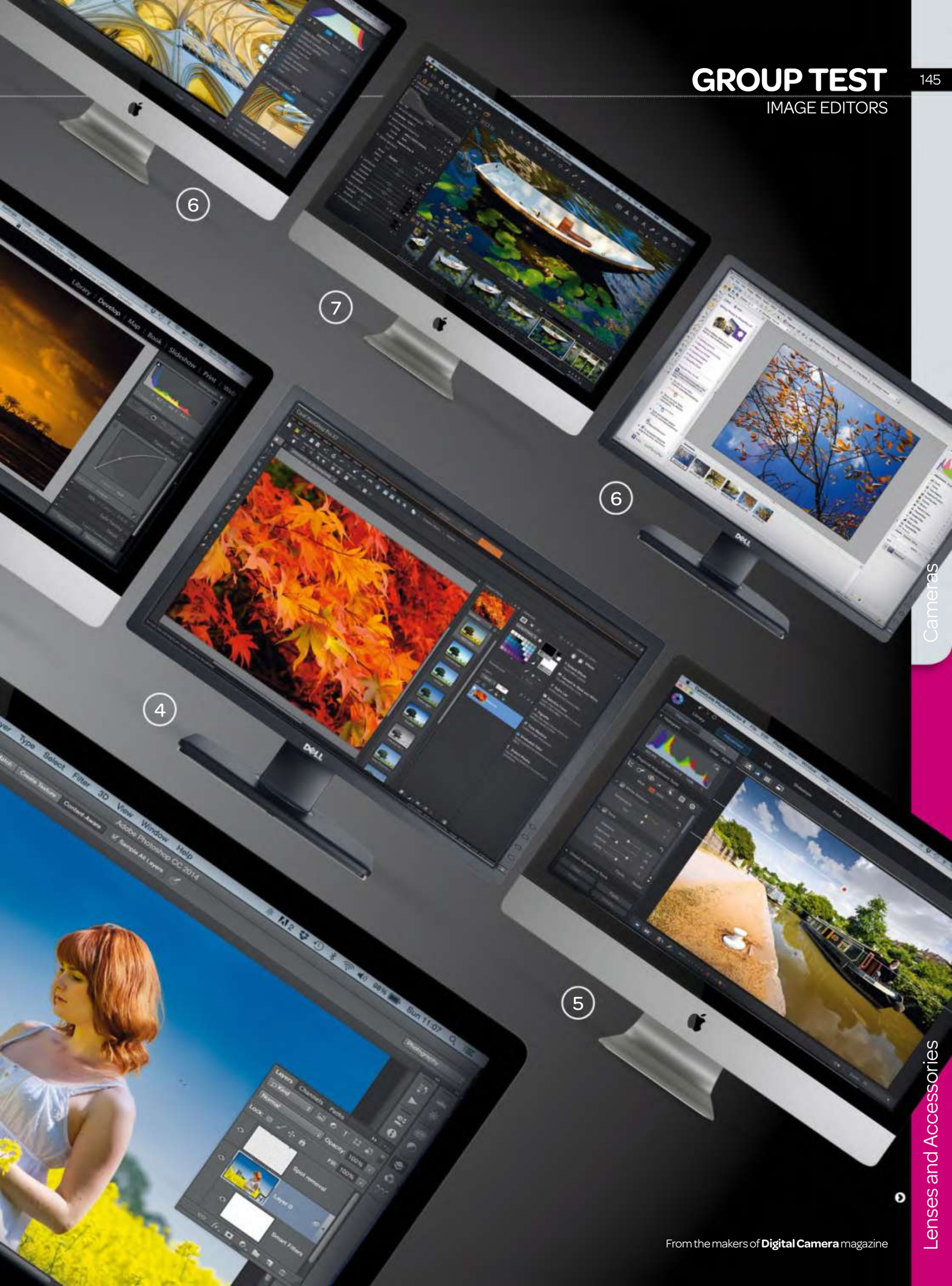
5 CyberLink PhotoDirector 6 £80 / $100 www.cyberlink.com
This amateur-orientated Lightroom challenger adds some interesting editing tools that its Adobe rival doesn't have, although that may not be enough.

6 DxO OpticsPro 10 £119 / $199 www.dxo.com
DxO's instant and automatic lens corrections can transform the results from your camera, and its raw conversions are among the best too.

7 Phase One Capture One Pro 8 £182 / $285 www.phaseoone.com
Phase One's professional image-capture and raw conversion program is only half a step behind Lightroom, and produces beautiful results.

8 Serif PhotoPlus X7 £80 / $125 www.serif.com
PhotoPlus promises the power of Photoshop at a fraction of the price, but can it compete now that the real thing is so affordable?

*via Adobe Creative Cloud Photography Plan subscription


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6
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Photoshop has long been regarded as the yardstick for all other image editors – but the market has changed. Photographers don't just need image-manipulation tools: they also need programs that can organise, search through and share an ever-growing library of photos. And as more of us shoot raw-format files, the quality of the raw conversion process and the tools you can bring to bear on it become more important.

So although Photoshop might still be the best image editor, an image editor in itself may no longer be enough for the things we want to do with our photos today. That's why we've rounded up eight different image-editing tools to cover all these different jobs, from regular image editors to image-cataloguing specialists like Lightroom and all-out raw converters like DxO OpticsPro.

TAG-TEAM EDITING

What's becoming increasingly obvious is that one program alone may not be enough. You may find you need to use two, or maybe even three, to get all the features you need. For example, Photoshop is brilliant at image-editing, but offers no tools at all for organising, searching and collating your photos. You can use its bundled companion program Adobe Bridge, but that's really just a file browsing tool, and relies on you maintaining a rigid folder-based filing system. The larger your image collections become, and the more you want to find, use and share your photos in different ways, the more difficult it becomes to use folders alone.

> "What's becoming increasingly obvious is that one program alone may not be enough"

That's why many photographers use Lightroom alongside Photoshop. Lightroom tackles the complex image management jobs that Photoshop is not designed for and makes light work of day-to-day enhancements and raw files, while Photoshop takes care of the advanced image-editing tasks that Lightroom can't do. It's no accident that Adobe is bundling both together in its current subscription-based Photography Plan. They complement each other perfectly and, in many ways, they belong together.

Photoshop Elements is a more complete package, coming with its own Organizer app to look after your photo collection. But it is designed for casual snappers and enthusiasts in a way that's very obvious, and sometimes a little irritating. It has limitations for more advanced work, and while once it cost a fraction of the price you paid for Photoshop, the gap is now effectively very narrow if you stay up to date with each release.

LIGHTROOM RIVALS

Lightroom does not have the image cataloguing and raw conversion market to itself. Cyberlink PhotoDirector 6 offers many of the same tools with a more amateur-orientated twist, while Capture One Pro 8 is bearing down on Lightroom from the professional end of the market, with its own cataloguing tools and a highly competitive set of raw image adjustments.

It's interesting to compare the results from these different raw conversion tools. Adobe Camera Raw, as used by Photoshop and Lightroom, is by far the best-known and most widely used raw converter, but that doesn't mean it's the best. DxO OpticsPro takes raw conversion quality to the extreme, using lab-developed camera and lens profiles and constantly developing technology to deliver results you may not have realised your camera is capable of.

THE OLD VERSUS THE NEW

Digital imaging is going through some exciting times. So where does this leave old favourites like Corel PaintShop Pro and Serif PhotoPlus? Both have proved popular with PC owners looking for lower-cost solutions, but times are changing. Which companies are ahead of the curve, and which are trading on past glories? And can any of them topple the mighty Adobe from its perch?

How we test software

Six of these programs come in both Mac and Windows versions. These were tested on a dual-core Mac with 8GB RAM running OS X 10.10 Yosemite. Two, Corel PaintShop Pro X7 and Serif PagePlus X7, are Windows-only. These were tested on a dual-core PC with 4GB RAM running Windows 7. Given the performance difference between the two machines, allowances were made for operational speed.

The eight applications were evaluated using a range of criteria:

- The range of tools: not just editing options, but image management.
- Raw conversion quality – an increasingly important factor for today's photographers.
- Ease of use and interface design.
- The range of effects, and the quality of results.
- Suitability for users of different skill levels.

The brief was principally to bring together all the leading commercial image-editing programs on the market to see how well they catered for the evolving needs of digital photographers. We use reviewers with long-standing software experience, both with the products being tested and their previous versions.

Non-destructive editing

Traditional image-editing processes permanently modify the pixels in the image. Once you've made changes, there's no way back. This means you need to save a new version of your photo so that the original is still available, and while programs like Photoshop offer some degree of undoing, even after the file has been saved, editing is usually an irreversible process.

The increased use of raw files, however, poses a challenge to this convention, because they cannot be edited directly. The solution is to use non-destructive editing tools, which change the appearance of the raw file being edited but are only applied permanently when a new, processed JPEG or TIFF file is exported. The advantages of this approach are:

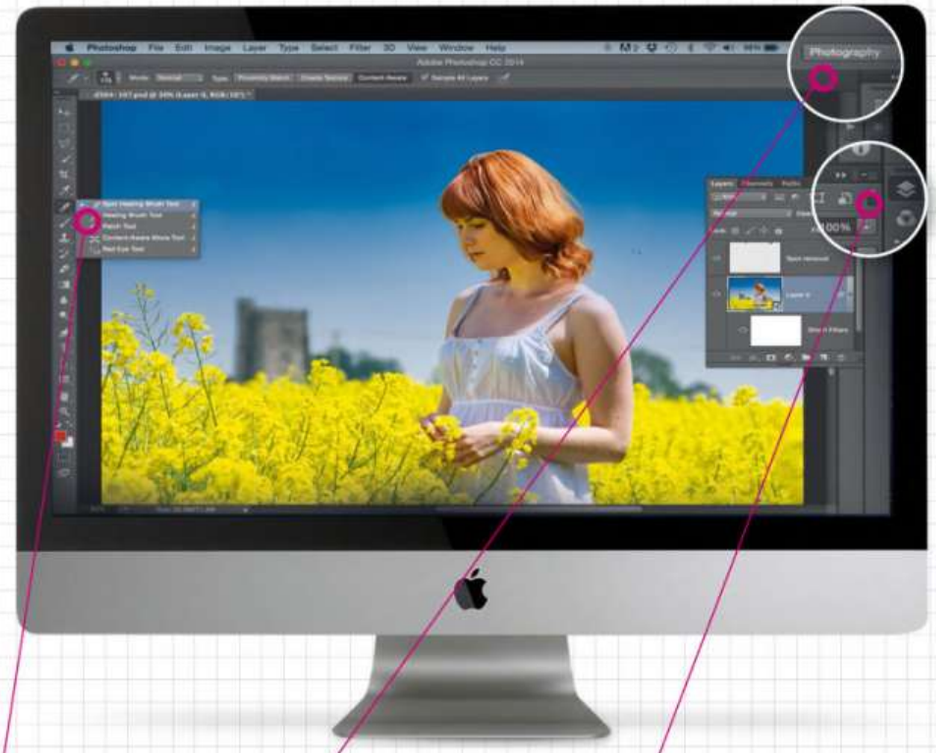


Above Software with non-destructive editing tools give you the ultimate in photo processing flexibility.

- All adjustments can be reworked and wound back at any time – even years later.
- The original file is unaltered – and this can apply to regular JPEGs, not just raw files.
- It saves disk space because edited versions are 'virtual' until you export new files.

Get to know... Adobe Photoshop CC 2015

One of the best-known user interfaces in the world



TOOLS PANEL
Many of the tools have fly-out panels for choosing different tool variations.

WORKSPACE
The Photography workspace hides 3D, drawing and design tools you don't need.

PANELS
The panels can pop open when you need them, then close again when you're finished.

Adobe Photoshop CC 2015

£8.57 / $9.99 per month*

WINDOWS/MAC Is it worth paying for monthly?

Adobe caused controversy when it swapped over to a subscription-only plan for Photoshop purchases, but Adobe has since cut the fee right down to under £9 per month – and that includes a subscription to Lightroom 6.

This means you can get both programs for less than £100 each year, with automatic updates. The most recent major update was in June 2015, when Adobe upgraded from the 2014 edition to the new Photoshop CC 2015 version.

The update has brought with it a performance boost, making Heal and Patch edits much faster. The new version also has a Dehaze tool that boosts contrast and saturation, along with controls to add grain for more realistic results after the Blur Gallery filters have been applied.

> "Photoshop will let you do practically anything you want – if you know what you want"

In addition, there are tools to help those working collaboratively as well as designers producing media for consumption on different platforms. Collaboration and connectitivty are key buzz words for Adobe right now.



Software spotlight
Layers and masks

Many image-editors offer layers, but Photoshop brings a special blend of power and simplicity, thanks to Smart Objects with undo-able filters, fast and effective masking tools and the integration of blend modes and adjustment layers.

Consequently, a key element of Adobe's Creative Cloud subscription is its community aspect. It also works alongside free Adobe iOS apps such as Photoshop Mix, for mobile image-editing, Photoshop Sketch, Adobe Color and Adobe Shape.

PERFORMANCE

There are simpler, cheaper alternatives to Photoshop CC, but no other program can match its depth, power and sophistication. Yet Adobe has managed to condense all this power into a clean, straightforward and efficient interface.

Photoshop excels at effects, montages, layers and selections. Although it's largely a traditional 'destructive' editor, it can do non-destructive editing too, thanks to Adobe Camera Raw, Adjustment Layers and Smart Objects, which let you rework plug-in filter settings.

Photoshop doesn't offer a whole lot of help to beginners – but by Adobe's way of thinking, that's what Photoshop Elements is for. Neither does Photoshop offer much by way of creative guidance. It'll let you do practically anything you want – if you know what you want in the first place.

* Photography Plan, with Lightroom

Digital Camera

FEATURES	EASE OF USE
★★★★★	★★★★½
RESULTS	VALUE
★★★★★	★★★★★

Overall ★★★★★

Get to know... Adobe Photoshop Elements 13

An interface that can evolve as your editing skills improve



TOOLS PANEL
Elements has many of the tools in Photoshop, but in a novice-friendly interface.

EDIT MODES
Expert mode gives most control; Guided and Quick are mainly for editing novices.

TOOL OPTIONS
When you select a tool, its options are displayed in this area below the image.



Software spotlight
Guided edits

The Guided mode in Elements is a great introduction to more advanced techniques. Each process follows a step-by-step sequence, where each step is accompanied by a short explanation of what's involved and how that particular tool or process works.

Adobe Photoshop Elements 13

£81 / $100

WINDOWS/MAC It's Photoshop for editing novices

Photoshop Elements has long been popular with photographers looking for a cheaper and easier alternative to Photoshop, but Adobe's swap to a subscription plan for Photoshop means the price differential is almost gone – you can get Photoshop CC and Lightroom 5 for a year for just £20 more.

But Elements is still the easier option for image-editing novices. The Organizer app can sort, organise and search your whole photo library, and it connects directly with the Editor application, which has three modes: Quick, Guided and Expert.

Quick mode offers basic, push-button enhancements, but Guided mode is more interesting because you can try out effects and learn how they're done at the same time.

> "The Crop tool suggests four different ways for you to compose your image"

Expert mode is where you get to take full manual control, and it offers a good proportion of the tools in Photoshop itself – although the tool options panel design takes up a little too much space at the bottom of the screen.

Elements 13 introduces an eLive panel that links to online resources and tutorials. Otherwise, the additions since version 12 are small: you can now use Photomerge Compose to blend objects from different images more convincingly; it's possible to nudge selections precisely into position; and the Crop tool suggests four different ways for you to compose your image.

PERFORMANCE

Back when Photoshop cost hundreds of pounds to buy, it was easy to accept that Elements offered a cut-down toolset. Now it's not. You don't get Curves adjustments (the Adjust Color Curves panel is not really a proper substitute); you can't work in CMYK or Lab colour modes; and you don't get Path or Pen tools for more complex editable selections.

Perhaps the biggest loss to photographers, however, is inside Adobe Camera Raw. The version that comes with Photoshop has 10 panels and is practically an image-editor in its own right. The version that comes with Elements has just three panels, catering for only the most basic raw-format adjustments.

Digital Camera

FEATURES	EASE OF USE
★★★★☆	★★★★☆
RESULTS	**VALUE**
★★★★☆	★★★☆☆

Overall ★★★★☆

Get to know... Adobe Photoshop Lightroom 6
Devoted to helping you get the most out of your photos



ATTRIBUTES
You can add ratings, colour labels and flags to images, and filter them later.

PANELS
The image enhancement option and effects are displayed in these stacked panels.

TOOLS
You can crop images, add gradient and radial filters and even clone out objects.



Software spotlight
Lightroom library
Lightroom's editing tools are only half the story – its real power lies in its image-cataloguing tools. Each image can be assigned different attributes, such as a star rating, colour label or flag, and you can add keywords, captions, copyright information and more, then filter your images.

Adobe Photoshop Lightroom 6

£8.57 / $9.99 per month*

WINDOWS/MAC Image cataloguing and editing in one

Digital Camera GOLD AWARD

Photoshop is a terrific image editor, but its companion Bridge is not designed for managing large photo collections. Lightroom is. It's based around a powerful image management database, and can make light work of organising, filtering and searching big image collections.

The editing tools are the same as those in Photoshop's Camera Raw plug-in, reconfigured into a single window. Modules address each stage of your photographic workflow: importing and organising your photos, enhancing them, then sharing and printing them via Slideshow, Book, Print and Web modules. You can even log where they were taken.

> "It can make light work of organising, filtering and searching big image collections"

Lightroom's editing adjustments are non-destructive. You can revisit and rework them any time you like. If you want to use these edited images in any other applications, you can export them as JPEGs or TIFFs.

PERFORMANCE

Lightroom's cataloguing tools are terrific, but because it's based around Adobe Camera Raw, its editing options are limited. You can apply localised adjustments with a brush, graduated and radial filters, and you can remove spots or unwanted objects with the Spot Removal tool. There's also automatic lens correction (for supported lenses) and an excellent Upright tool for fixing converging verticals and other perspective issues.

What you can't do is create layered images, make complex corrections or create sophisticated multi-step effects. For that, you'll still need Photoshop. The good news is that if you subscribe to Adobe's Photography Plan, you get both.

You can still get Lightroom 6 as a regular purchase with a permanent licence, but it costs more than a one-year subscription to Photoshop CC and Lightroom together.

A subscription will also enable you to get the most from your mobile device – there's a free Lightroom Mobile app for iOS or Android, which offers basic editing and organising tools and synchronises with the desktop version.

* Photography Plan, with Photoshop CC. Permanent licence, £103 / $149.

Digital Camera

FEATURES	EASE OF USE
★★★★★	★★★★★
RESULTS	**VALUE**
★★★★☆	★★★★★

Overall ★★★★★

Get to know... Corel PaintShop Pro X7
A program that's become increasingly novice-friendly



INSTANT EFFECTS
The Effects panel offers a good choice, and you can hide it to save space.

LEARNING CENTRE
PaintShop Pro's Learning Centre helps you discover image-editing techniques as you go.

LAYERS
These work in much the same way as the layers in Photoshop and Elements.

Corel PaintShop Pro X7

£60 / $80

WINDOWS One of Photoshop's oldest rivals

PaintShop Pro has become simpler and more novice-friendly over the years. It now presents an integrated workflow with three tabs: Manage, Adjust and Edit.

The Manage tab takes care of your photo organisation. You can browse folders directly without having to import them, but you can also create virtual and smart collections. On the whole, it's simple and straightforward to understand.

The Adjust panel is for routine image enhancements, and offers a good selection of effects. These adjustments are not non-destructive, though – PaintShop Pro might look like Lightroom and PhotoDirector, but in fact it's a traditional editor that edits your images directly, saving new versions of your files when it's done.

> "PaintShop Pro might look like Lightroom, but in fact it's a traditional editor"

The Edit panel offers more advanced and manual controls, such as the levels, curves and colour adjustments you'd use in Photoshop. PaintShop Pro is also compatible, Corel says, with Photoshop plug-ins, so you can add extra tools.



Software spotlight
Special effects

PaintShop Pro X7 comes with eight special effects, each of which gets its own dedicated tools. This is the Selective Focus effect: it's like the tilt-shift tools in other image-editors and plug-ins.

The new X7 version brings a Magic Fill tool (the equivalent of Adobe's Content-Aware Fill), 30% faster brushes, and text- and shape-cutting tools. This underlines that fact that PaintShop Pro is not just for image-editing – it's an all-round painting, drawing and illustration tool.

PERFORMANCE

The editing tools are comprehensive, but they're also a little clunky. The adjustment dialog boxes offer small before and after previews, which seems terribly old-fashioned. There is a checkbox to display the results of your adjustments live, but the screen updates are not quick.

Worst of all, it falls down on one of the most basic operations for an image editor today: opening and converting raw files. It has a Camera Raw Lab, which opens automatically if you select a raw image for the Edit mode. Oddly, this can be bypassed if you simply use the Adjust mode, with rather poor results.

Not that the Camera Raw Lab's results are much better. The tools are limited and the quality of the conversions is poor. You'll have to work pretty hard to equal the quality of your camera's JPEGs, let alone improve on them.

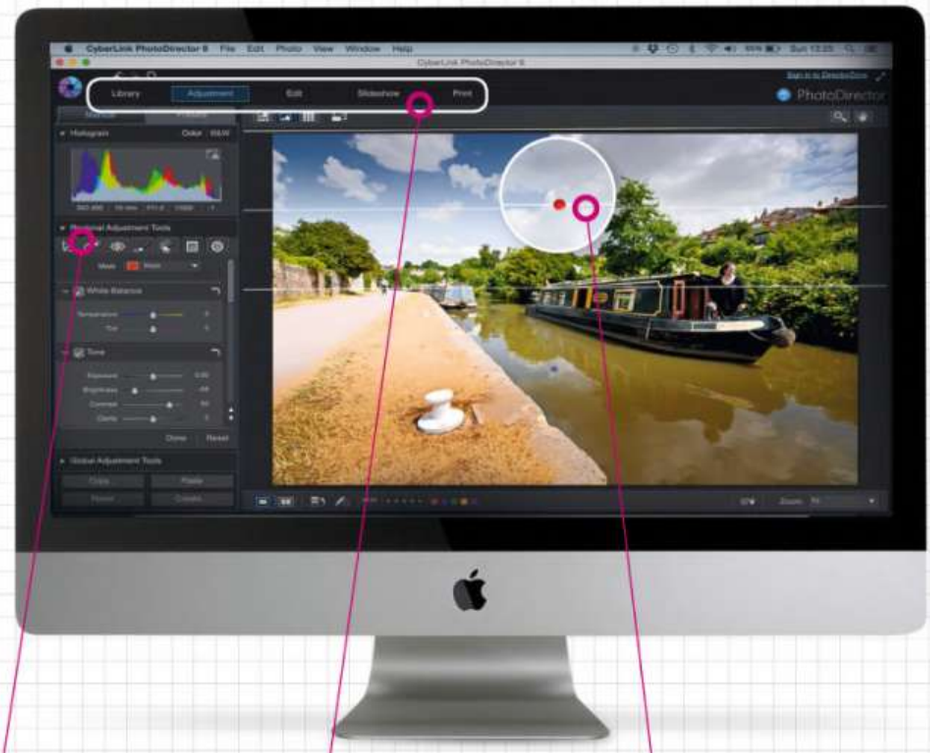
Digital Camera

FEATURES	EASE OF USE
★★★★☆	★★☆☆☆
RESULTS	**VALUE**
★★☆☆☆	★★★☆☆

Overall ★★★☆☆

Get to know... Cyberlink PhotoDirector 6 Ultra

Discover photo editing at its purest



TOOLS
All the tools in the Adjust module are non-destructive – you can use preset effects too.

MODULES
Like Lightroom, PhotoDirector organises your tools into modules to avoid clutter.

ADJUSTMENTS
This is PhotoDirector's graduated filter in action – it's just like Lightroom's.

Cyberlink PhotoDirector 6 Ultra

£80 / $100

WINDOWS/MAC This Lightroom look-alike undercuts it

The resemblance of PhotoDirector to Lightroom is quite striking. It has the same broad workflow, with different modules running across the top. These include a Library, Adjustment, Edit, Slideshow and Print panels. It doesn't have Lightroom's Map, Book, Slideshow and Web panels, but these are probably not on top of most photographers' must-have lists.

So why does PhotoDirector have both an Adjustment and an Edit tab? That's because they respectively offer non-destructive and destructive adjustments for your use.

Lightroom's editing tools are non-destructive. But there are things a non-destructive tool like this can't do, like layers and masks; for those, Lightroom passes you over to the traditional tools of Photoshop.

> "The Edit tools don't cover the whole range of projects people might want to try"

PhotoDirector, however, offers many of these conventional adjustments without the need for an second program. In the Edit panel you can remove objects or backgrounds, combine images, blend HDR exposure sequences, create panoramas and make people look more beautiful with Beautifier tools and a Body Shaper.

The downside is that these tools are quite amateur-orientated. They certainly don't cover the whole range of photo projects and adjustments people might want to try – and, unlike Lightroom, PhotoDirector doesn't let you seamlessly transfer images to a second image editor.



Software spotlight
Edit module

PhotoDirector's Adjustment module offers non-destructive editing tools, just like Lightroom, but its Edit module acts like a regular image editor. But while these Edit tools add to PhotoDirector's versatility, they don't go far enough to replace a regular image editor.

PERFORMANCE

It's in the Adjustment panel that you get to carry out the same non-destructive enhancements as Lightroom, and it's where the similarities are most obvious, right down to the Adjustment Brush, Gradient Mask, Radial Mask and Spot Removal tools.

It's all very smooth and slick, but you can never escape the feeling that you're working with a cut-price Lightroom clone – except that the price isn't cut by much. You get extra tools in the Edit panel, but there's no equivalent of Lightroom's Upright automatic perspective correction tool, its Quick Develop tools, or its Smart Previews for editing images stored on disconnected devices.

Digital Camera

FEATURES	EASE OF USE
★★★★☆	★★★☆☆
RESULTS	**VALUE**
★★★★☆	★★★★☆

Overall ★★★★☆

Get to know... DxO OpticsPro 10 Elite

Software to help your digital photos sparkle



DxO OpticsPro 10 Elite

£159 / $199

WINDOWS/MAC The most specialised program on test

DxO OpticsPro detects the different degrees of distortion, chromatic aberration, edge softness and vignetting common to practically all digital camera lenses, then compensates for them. It checks the EXIF shooting data embedded in the image by the camera, then looks up the combination of camera body and lens in its test database.

It's also a raw converter, and DxO has applied just as much scientific rigour to this process as to its lens corrections. (Fujifilm owners take note, though – OpticsPro does not currently support X-Trans sensors.) You can apply a range of presets – you get to see how your image will look before you choose – or adjust the settings manually.

> "The difference in detail and noise control compared with Camera Raw is obvious"

At this point, OpticsPro can get quite technical, especially when you're juggling the Exposure Compensation, Smart Lighting and Selective Tone settings to get the best tonal balance and dynamic range. It's worth it, though, because DxO OpticsPro's raw conversions are quite superb. The difference in detail rendition and noise control compared with Adobe Camera Raw is immediately obvious.



Software spotlight
ViewPoint and FilmPack

DxO makes two other programs – ViewPoint 2.5 and FilmPack, both £59 – which can now integrate with OpticsPro as plug-ins. You'll now need ViewPoint to apply geometric corrections. FilmPack 5, meanwhile, is designed to reproduce old films and darkroom processes.

PERFORMANCE

OpticsPro now integrates directly with DxO's ViewPoint 2.5 and FilmPack 5 programs. ViewPoint offers advanced perspective corrections, while FilmPack replicates the look of classic films, darkroom processes and cheap cameras.

DxO has also made its Prime de-noising process faster. The standard noise reduction is impressive, but Prime can work the most amazing transformations on high ISO images, although it's slow.

A new ClearView option applies localised contrast enhancement to improve distant landscape scenes, and, according to DxO, the program is 1.5 times faster to launch and 10 times faster at loading files.

The results from OpticsPro are excellent. However, it lacks any image cataloguing tools and localised adjustments, so it could never be your one and only image-editing tool.

Both Essential and Elite editions handle all cameras, but you need Elite for the more advanced tools.

Digital Camera

FEATURES	EASE OF USE
★★★★☆	★★★★☆
RESULTS	VALUE
★★★★☆	★★★☆☆

Overall ★★★★☆

Get to know... Phase One Capture One Pro 8
From a niche tool to a genuine Lightroom contender



TOOLS AND TABS
The tools and tabs can be rearranged to suit your preferred working methods.

VIEWER
This shows the image you're working on, which is selected in the Browser.

VARIANTS
You can work on existing images or create a Variant so you can experiment with your edits.

Phase One Capture One Pro 8

£182 / $285

WINDOWS/MAC Software that's as good as its cameras?

Capture One began as a professional tethered shooting studio application, but has steadily migrated towards mainstream use. With the addition of full cataloguing tools in version 7, Capture One became a direct rival to Lightroom, offering raw conversions for a wide range of cameras, powerful non-destructive image adjustments, style presets, automatic lens corrections and local adjustments made with adjustment layers and masks – an easier approach to grasp than Lightroom's, and powerful too.

Version 8 brings an updated processing engine, a modernised interface (the slider knobs are bigger, but nothing else leaps out), improved HDR tools, better noise and moiré reduction, a speed boost and sundry other improvements.

> "The result is a terrific impression of sharpness, clarity and definition"

The basic workflow is the same, though. You import images into the Catalog, then use a series of tool tabs to adjust Color, Exposure, Lens (corrections), Composition (cropping, straightening, keystone correction), Details (sharpening, noise reduction, grain) and batch-processing options.

You can rearrange these tabs to suit your workflow, hide the ones you don't want and re-arrange your favourites into a single Q (quick) tab.



Software spotlight
Variants

Capture One Pro can and create Variants, which apply different treatments to one photo without changing the original. Variants can be processed and exported in just the same way as real photos. This takes up a lot less space than creating real copies of files in a program like Photoshop.

PERFORMANCE

Capture One Pro is expensive compared to its rivals, so you'd expect the results to be good. In fact, they are more than just good. Capture One Pro can extract exceptional detail from raw files – the difference compared to JPEGs, or even Adobe Camera Raw conversions, can be striking.

It also produces strong, powerful colours and contrast, and extremely good separation of shadow tones. The result is a terrific impression of sharpness, clarity and definition.

But Capture One Pro has a flaw. It does not support external editors or plug-ins, so you can't send an image to Photoshop or Google's Nik Collection plug-ins, for example, and have the edited version returned automatically to the Capture One Catalog. If Phase One were to add this, then Capture One Pro would have five-star potential.

Digital Camera

FEATURES	EASE OF USE
★★★★★	★★★★★
RESULTS	VALUE
★★★★★	★★☆☆☆

Overall ★★★★☆

Get to know... Serif PhotoPlus X7
A powerful image-editor that's easy to get into



Serif PhotoPlus X7

£80 / $125

WINDOWS Photoshop power at a budget price

PhotoPlus's similarity to Photoshop is obvious, right down to the screen layout, with a tools palette on the left, tool options on the top toolbar and stacked palettes including adjustments and layers on the right. But then the two programs diverge. PhotoPlus X7 has beginners in mind, and features an array of Studios for creating different photo effects.

There's a general-purpose PhotoFix Studio, for example, plus Makeover Studio, Black and White Studio, Warp Studio, Cutout Studio and Print Studio.

This latest version adds support for Lab mode (useful for certain kinds of colour adjustment), lens corrections and a Clarity filter, which boosts local contrast for added definition. The Clone tool from earlier releases is improved, with an advanced live preview; the PhotoFix Studio has a Smart Brush tool for applying adjustments to specific areas; and there are three new blend modes for layers: Vivid Light, Hard Mix and Pin Light.

> "PhotoPlus X7 has beginners in mind, and features an array of Studios for effects"



Software spotlight
Photoshop on the cheap

On paper, PhotoPlus X7 does practically everything that Photoshop does. If you're patient and stick at it, you'll able to achieve some decent results. Mac owners will soon be able to get a Serif image editor: the company is working on Affinity Photos to line up alongside its Affinity Designer program.

PERFORMANCE

These features are worth having, but they don't address PhotoPlus's principal failings. One problem is that it's confusing – why have a PhotoFix window, for example, that carries out what look like similar adjustments to the main editor window? Another is the poor quality of some of the tools. The slow and ponderous Cutout Studio, for example, had trouble cutting out a dark grey set against a near-white sky – a simple subject.

Worst of all, though, is the Raw Studio. This supports most cameras (there's a list on the Serif website), but the quality between models varies massively. The results from a Nikon D7100 seemed OK, but those from a Nikon D5200 looked dark and muddy. As if that wasn't enough, if you try to open a raw file that PhotoPlus X7 doesn't support, it doesn't tell you so – it just creates a really bad conversion with distorted colours and muddy tonal rendition.

In itself, PhotoPlus X7 is patchy but reasonable – but the low quality of its raw conversions is a major drawback for anyone using it to work on their own photos.

Digital Camera

FEATURES	EASE OF USE
★★★★☆	★★☆☆☆
RESULTS	VALUE
★★★☆☆	★★★☆☆

Overall ★★★☆☆

THE DIGITAL CAMERA VERDICT

ADOBE STAYS ON TOP

The combo of Photoshop, Lightroom and a low-cost sub is unbeatable

One thing has become clear. If you want the best image cataloguing tool, the best raw converter and the best image-editor, you're not going to find them in one program – but you might in one package. Available for a single subscription fee, the Photoshop CC and Lightroom 6 combination comes closest to a single do-it-all solution, especially since they work so well together.

But that's not quite the whole story. More photographers are shooting in raw to get the best possible quality. Here, DxO OpticsPro 10 and Capture One Pro 8 deliver the best images.



THE RESULTS Our top three image editors in a nutshell

ADOBE PHOTOGRAPHY PLAN

What's good: You get the world's best image editor and (possibly) the best image-cataloguing tool, all for under £9 per month.

What's bad: Adobe Camera Raw (used in both Photoshop and Lightroom) is a good raw converter – but it's not the best.

We say: This is by far the most powerful and complete solution and it doesn't really cost much more than its rivals.

DXO OPTICSPRO 10

What's good: Excellent lens and perspective corrections; superb raw conversions and noise reduction.

What's bad: Too specialised to be your only software, with no cataloguing tools and no localised adjustments.

We say: You thought Adobe Camera Raw did a good job with raw files? DxO OpticsPro will open your eyes.

PHASE ONE CAPTURE ONE PRO 8

What's good: Exceptional fine detail; rich and saturated raw conversions; local adjustments; cataloguing.

What's bad: No support for external editors or plug-ins – its one weakness compared to Lightroom.

We say: If you're more interested in ultimate quality than do-it-all versatility, this is a serious contender.

HOW THE IMAGE EDITORS COMPARE



Product name	Adobe Photoshop CC 2015	Adobe Photoshop Elements 13	Adobe Photoshop Lightroom 6	Corel PaintShop Pro Ultimate X7	Cyberlink PhotoDirector 6	DxO OpticsPro 10 Elite	Phase One Capture One Pro 8	Serif PhotoPlus X7
Price	£8.57 / $9.99 a month*	£81 / $100	£8.57 / $9.99 a month*; or £103 / $149	£60 / $80	£80 / $100	£159 / $199	£182 / $285	£80 / $125
Website	www.adobe.com	www.adobe.com	www.adobe.com	www.corel.com	cyberlink.com	www.dxo.com	phaseone.com	www.serif.com
Platform	Windows / Mac	Windows / Mac	Windows / Mac	Windows	Windows / Mac	Windows / Mac	Windows / Mac	Windows
Raw support	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Y
Browsing	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Y
Catalogue	No	Yes	Yes	Yes	Yes	No	Yes	Y
Virtual copies	No	No	Yes	No	Yes	Yes	Yes	N
Lens correction	Automatic	No	Automatic	Manual	Automatic	Automatic	Automatic	Manual
Layers	Yes	Yes	No	Yes	Yes	No	Limited	Y
Plug-ins	Yes	Yes	Yes	Yes	N	Yes	No	Y
FEATURES	★★★★★	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★★	★★★★☆
EASE OF USE	★★★★☆	★★★★☆	★★★★★	★★☆☆☆	★★★☆☆	★★★★☆	★★★★★	★★☆☆☆
RESULTS	★★★★★	★★★★☆	★★★★☆	★★☆☆☆	★★★★☆	★★★★☆	★★★★★	★★★☆☆
VALUE	★★★★★	★★★☆☆	★★★★★	★★★☆☆	★★★★☆	★★★☆☆	★★☆☆☆	★★★☆☆
OVERALL	★★★★★	★★★★☆	★★★★★	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★☆☆

*Adobe Creative Cloud Photography Plan includes Photoshop CC and Lightroom

Shoulder bags

Style and substance: six bags that'll carry plenty of kit but also look great

1 Billingham 307

Price: £300 / $500
Web: www.billingham.co.uk

The classy 307 is beautifully made from weatherproof canvas, with leather accents and handles. The main compartment's aluminium and fibreglass rim holds the bag open for access. There's space for a large SLR and attached lens, plus two to three more lenses. Two generous front pockets can swallow a couple of flashguns and smaller accessories.

We say: Lives up to Billingham's reputation.

★★★★★

2 Domke Chronicle

Price: From £270 / $300
Web: www.tiffen.com

This is a clever design. Expandable side pockets help keep the bag compact, yet there's space inside for a large SLR body and up to four lenses, with fast access via a zip slot. Velcro silencing for the main flap keeps you inconspicuous. The bag comes in weatherproof black, khaki or military green; prices vary considerably according to fabric.

We say: Stylish and versatile.

★★★★★

3 Jill-e Jack Camera Messenger

Price: £200 / $200
Web: www.jill-e.com

The Jack can certainly handle a lot of kit. It can hold a couple of SLR bodies and three or four lenses inside its spacious main compartment, and a separate pocket can hold a 15-inch laptop. Front and side pockets give plenty of accessory storage. The downside is that this is the bulkiest bag of the bunch; it can get awkward on crowded streets.

We say: If only it was more comfortable...

★★★★☆



The 307 is available in smart, grown-up sage/chocolate, khaki/chocolate or black.

The Chronicle has all the space, style and features you could want.

Here's a bag with enough storage potential to put some backpacks to shame.

Leader of the packed

Three things to consider when you're looking for the perfect shoulder bag

1 Size matters
Fill a big bag and it'll be a pain in the neck after a day's shooting; but buy one that's too small, and you won't have room for the essentials.

2 Instant access
Missing a crucial shot when you can't get at your SLR fast enough just won't do. Make sure that your choice of bag can be opened in a hurry.

3 Rain check
Most bags offer weather protection, but some are sealed better than others, and may also come with an extra rain cover.

4 Manfrotto Pro Shoulder Bag 20

Price: £125 / $150
Web: www.manfrotto.co.uk

Its basic style may look drab next to more retro-chic options, but this bag packs plenty of practicality. Its slim size is ideal for the city, yet there's space for a large SLR with lens, plus three or four extra lenses, accessories and a tablet, all well-protected. Like the Domke, this has a top slot for fast access, plus a rain cover. The wide strap is kind on your shoulder.

We say: This bag nails the basics brilliantly.

★★★★☆

Don't be fooled by the bland styling: there's a lot to like about this no-nonsense bag.

5 Oberwerth München

Price: £442 / $700
Web: www.oberwerth.com

The hand-made München exudes quality in every stitch. The hard-wearing materials give decent weather and scuff protection, while a removable cushioned insert protects your kit. Space is at a premium, though: it's a squeeze to store a full-frame SLR and two lenses. At least there's a pair of front pockets to provide a home for accessories.

We say: Fine if style is a priority.

★★★★☆

You'll need to be wearing a blazer, corduroy trousers and brogues to really pull this off.

6 Think Tank Retrospective 40

Price: £170 / $220
Web: www.thinktankphoto.com

Want a more casual-looking design? This bag's washed canvas exterior should be ideal. But the soft feel makes the bag squashy, while gaps at either end of the flap leave your kit open to the elements. There's room for your SLR with attached lens, plus three largish lenses. If the side pockets aren't enough, optional pouches can be attached.

We say: Not the safest option.

★★★☆☆

Whichever finish you go for, the Retrospective 40 holds your camera kit nicely.



Travel Tripods

Fed up with bulky tripods? Try these travel-friendly legs for size



1 Benro Travel Angel FTA18CC

Price: £255/$306
Web: www.benrousa.com

At 1.55kg, the FTA18CC isn't as light as some of our options, but it has nine-layer, four-section carbon-fibre legs, which with its centre column give a 150cm platform. Everything feels reassuringly robust, too, and its 8kg payload rating will support a full-frame SLR with a mid-sized lens.

The limiting factor – as usual – is the small ball head. Benro's offering is well made, though, with smooth, adjustable friction and a separate pan base.

It's the extra features that make this tripod shine. One leg can be detached to form a monopod or hiking pole. You even get three additional spiked feet.

OVERALL SCORE ★★★★★



2 Manfrotto Befree MKBFRC4-BH

Price: £280/$350
Web: www.manfrotto.co.uk

They say less is more, and with its featherweight 1.1kg mass costing a premium, that holds true here. You get carbon-fibre build and attention to detail, with leg angle clamps that are a cinch to use when wearing gloves, plus a small but capable ball head.

However, this doesn't have adjustable friction, and a single knob locks both the ball and pan base.

The weight-saving drawbacks don't end there: the 142cm maximum height is the shortest here, and the payload is just 4kg. There's also some leg flex, so mounting anything more than an APS-C SLR with a small lens is asking a lot.

OVERALL SCORE ★★★★★



3 Mefoto GlobeTrotter

Price: £290/$249
Web: www.mefoto.com

MeFOTO is a division of Benro, specialising in eye-catching legs. The GlobeTrotter has five colour options: blue, red, green, titanium and black. Happily, style doesn't come at the expense of substance here, because the GlobeTrotter's construction quality is first class, while the five-section carbon fibre legs stand strong with up to 12kg of kit.

This is also the tallest tripod on test, topping out at a lofty 163cm, yet packing down to a reasonably travel-friendly 42cm.

A removable monopod helps to justify the price, as does the excellent ball head with adjustable pan and head friction. Plus, it's suitable for a full-frame camera set-up.

OVERALL SCORE ★★★★½



4

Nest Traveller NT-6264CK

Price: £220
Web: www.nest-style.com

Nest continues to impress with this travel-orientated tripod. Its 150cm fully extended height, 41.5cm closed length and 1.49kg weight are all pretty average, but a huge 15kg payload certainly isn't – it's the most robust support here. However, the head is rated at 10kg.

The ball head doesn't feel like it's letting the side down, though, with precision aluminium build, adjustable friction and a lockable pan base.

As with the Benro and Mefoto supports, you get a monopod conversion trick, as well as two-stage leg-angle adjustment and twist-grip leg locks.

OVERALL SCORE ★★★★★



5

Vanguard VEO 265CB

Price: £250/$280
Web: www.vanguardworld.com

Vanguard's travel tripod seems a good blend of compactness and robustness. Its 8kg load capacity is respectable given its compact 39cm closed length and modest 1.5kg weight.

But the slender five-section carbon legs aren't very rigid; neither is the centre column. This can be positioned horizontally, or straight down for low shooting. However, the joint doesn't lock tightly enough, so a 1kg load causes the column to sag when horizontal, and it's not 100% rigid in its vertical position.

Mount a 750D or D5500 and the Veo holds steady. But the price seems high.

OVERALL SCORE ★★★☆☆



6

Velbon UT-53D

Price: £121/$285
Web: www.velbon.co.uk

At just shy of 30cm when closed, the UT-53D is by far the most compact set of legs in our line-up, yet it manages to reach over 155cm at full stretch.

The secrets to its extension ability are six-section legs and a two-section centre column. You needn't worry that so many components will mean sluggish set-up though, because just two clamps secure each leg. However, rigidity is compromised, and there's only a 3kg payload rating. Build and material quality aren't up to the standard of the rest of the group either – but the asking price is far lower, so don't rule it out.

OVERALL SCORE ★★★☆☆

Monopods

Six streamlined supports with clever tricks to help keep shots sharp

1 Manfrotto 685B Neotec

Price: £170 / $190
Web: www.manfrotto.com

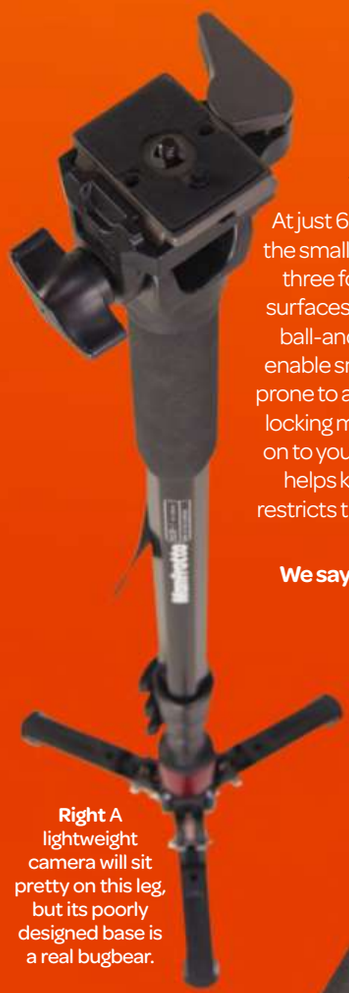
The 685B ditches conventional leg clamps in favour of a speedy pistol grip design. Simply squeeze the trigger and the three-section leg will pull out and lock where you release your grip. This is the only monopod here to have a conventional base with no flip-out feet; instead there's a single pedal so you can hold the base steady with your foot and extend the monopod with one hand. Large-diameter tubing will hold 8kg of kit at up to 170cm, yet the 685B weighs just 1.08kg.

We say: Just the ticket for capturing fast-paced action.

★★★★½



Right It's not cheap or particularly versatile, but it sure is quick to set up.



Right A lightweight camera will sit pretty on this leg, but its poorly designed base is a real bugbear.

2 Manfrotto 560B-1

Price: £139 / $170
Web: www.manfrotto.com

At just 66cm collapsed, the 560B-1 is one of the smaller sticks in our test, yet it still features three fold-out feet for better grip on loose surfaces. The leg and feet connect via a small ball-and-socket joint which is supposed to enable smooth panning. However, we found it prone to annoying jerks and sticking. There's no locking mechanism either, so if you don't hold on to your camera, it will tip over. Skinny tubing helps keep the weight down to 1.2kg, but it restricts the payload to just 2kg, making this the weakest monopod on test.

We say: You can do better for the money.

★★½☆☆

Right Assuming you've got space for it, the Mogopod is a pleasure to use and great for shooting stills and video.

3 Rollei Mogopod 1

Price: £152 / $238
Web: www.rollei.com

With its grippy foam padding, the Mogopod looks like it belongs in a gym rather than beneath your camera, but it hides some clever features. A single twist-lock extension clamp automatically opens and closes all three leg sections, making set-up a breeze. At the base is a smooth ball head with a knob to adjust friction or lock the head, plus three flip-out legs. These can be replaced with an optional pair of skate wheels to record tracking shots.

We say: Great for shooting stills and video.

★★★★★



Right Small touches like the domed cover cap for the head make this a comfortable walking companion.

5
Vanguard Veo AM-264TR

Price: £80 / $100
Web: www.vanguardworld.com

Not only is this the least expensive monopod here, it's also the most portable, tipping the scales at just 900g and boasting a mere 56.5cm collapsed length. It'll still extend to a useful 163cm, though, and it shapes up well as a walking pole, thanks to an ergonomic handle. However, the basic fixed head won't permit panning, so you'll have to rotate on the stiff ball and socket base instead. At least this can be locked to keep the Veo vertical. You also get a trio of flip-out feet, which are useful on loose terrain, although they're less effective on slopping surfaces, thanks to the ball joint's restricted articulation.

We say: The Veo's streamlined look works well on the go.

★★★★½



Right You've really got to get your hands on this leg to appreciate its stellar design and build.

4
Sirui P-324S

Price: £250/$265
Web: http://en.zssirui.com

At 1.45kg, the Sirui is the most portly monopod on test, and is actually heavier than some travel tripods. The upside is outstanding build quality, with eight-layer carbon fibre tubing that'll cope with 10kg of kit. The friction-adjustable ball head base can be locked to keep the stand upright, while up top, the grip pans smoothly through 360 degrees. Three twist-lock extension clamps enable the monopod to reach 175cm. But drop things down and spread the three support legs, and the P-324S will act as a table-top tripod for a small SLR or a CSC.

We say: Superb build and material quality.

★★★★★



Left Is it a monopod? Is it a tripod? You decide.

6
Velbon Pole Pod II

Price: £89 / $195
Web: www.velbon.biz

Here's a monopod that's more like a tripod with a very long centre column. The flip-out legs are a two-section design, with three angle options to help your camera stay upright on sloping ground. With the feet fully extended and spread to the max, there's enough stability to use the Pole Pod II as a free-standing table-top tripod, or you can mount your camera straight to the base and use it as a mini-tripod. Refit the main section and you've also got the tallest vantage point here, reaching 179.2cm at full stretch. It's still remarkably light at 960g, but that's partly due to some cheap-feeling materials that limit the payload to 2.5kg.

We say: A fine budget choice for lighter cameras.

★★★★½

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